

**PEST MANAGEMENT ALLIANCE PROJECT  
FINAL REPORT**

**A REDUCED-RISK PEST MANAGEMENT  
PROGRAM FOR WALNUTS – YEAR 3  
(JANUARY 1, 2001-DECEMBER 31, 2001)**

**AGREEMENT NUMBER 99-0253**

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**Prepared for the California Department of Pesticide Regulation**

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## EXECUTIVE SUMMARY

The walnut PMA work plan continues with the broad-based implementation project designed to encourage adoption of a reduced-risk pest management program in walnuts statewide. The focus of this project is to continue current efforts to develop and demonstrate reduced-risk management strategies on walnuts and to improve communication and cooperation among different groups involved in developing economical reduced-risk walnut production. The PMA project has evolved into a broader program than originally envisioned with individual researchers working closely with the PMA in the area of codling moth and walnut blight. This research feeds directly into the PMA project by allowing the PMA project to better focus on testing and demonstration that are near term. Several factors have increased the prospects for development of reduced-risk practices for codling moth, which is the primary target for broad-spectrum insecticides in walnuts. These factors include the documentation of resistance to the most commonly used insecticides and the development of newer pheromone application technologies, such as sprayable pheromone and puffers. This is coupled with the development of new, more selective insecticides that can help provide control without disruption of naturally occurring biological control. The codling moth PMA project in 2001 was able to successfully demonstrate mating disruption at the five sites including the use of Consep CM-F sprayable pheromone. Since sprayable pheromone is much easier for walnut growers to apply, this will make it easier for the growers to incorporate it into their codling moth control programs. The PMA sites were also able to demonstrate the use of a new monitoring lure that catches both males and females and that is a viable monitoring method in pheromone permeated orchards. Blight researchers have developed walnut bud sampling methods, eradicator sprays, and a blight model which the PMA has been able to field test for growers in designated demonstration sites, as well as helping growers learn to use the blight model, Xanthocast. The PMA will continue to develop management techniques from research funded by the Walnut Marketing Board using UC IPM monitoring programs refined by the walnut PMA, and outreach programs that will result in increased adoption of reduced-risk walnut programs to slow the trend of increased pesticide use in walnuts.

## INTRODUCTION

The objectives of the Walnut PMA continue to focus on standardized treatments using reduced-risk techniques with an emphasis on economic success for the grower. By building from the positive responses from the first two years, we continued to implement reduced-risk practices coupled with educational outreach. To compliment this framework, there are 7 objectives: (1) build upon the teamwork between the University of California Cooperative Extension, BIOS, California DPR, University Researchers, Industry leaders, PCA's, and Growers, (2) control codling moth using reduced-risk practices, (3) develop reduced-risk practices to control walnut blight, (4) demonstrate the feasibility of cover crops, (5) monitor for additional pests, (6) show the economic impact of a reduced-risk program, and (7) show pesticide use history in commercial walnuts. The PMA is a multi-faceted program that encompasses various technologies in order to assist the walnut industry to adopt reduced-risk strategies.

**Objective 1: Continue to build upon the Walnut Pest Management Alliance Team for implementation of reduced-risk strategies and extend the information to growers.**

The Walnut PMA Management Team is the drive behind the Walnut PMA. The Management Team is responsible for directing and implementing reduced-risk strategies, as well as standardizing treatments. The Team incorporates the various stakeholders into the program and seeks new ideas constantly. By meeting throughout the year to plan, coordinate, and share new ideas, the Management Team is able to work effectively and efficiently to ensure that the PMA gathers the most scientifically reliable and easy to interpret results across the state. Extending information is an important part of this project. Much of the information exchange occurs at the management team meetings between the partners. This is the first step to implementing successful reduced-risk programs. A wide variety of information can be presented in one arena and growers and other interested parties are able to participate in the process.

**Objective 2: Demonstrate IPM strategies to control codling moth, *Cydia pomonella*.**

Five blocks of early cultivar orchards were identified with cooperating growers and farm advisors as codling moth sites from Fresno to Tehama County. These early cultivars were chosen because they are varieties known to be highly susceptible to codling moth. All orchards were less than 35 feet in height and were the Vina variety, which is known to be codling moth susceptible. Seven treatments consisted of: Isomate C+ alone, Isomate C+ and *Trichogramma platneri*, Isomate C+ and Lorsban or Confirm, Consep's CM-flowable alone, CM-flowable and Lorsban or Confirm, Lorsban or Confirm alone, and the untreated control. The Lorsban or Confirm was sprayed depending on the codling moth population at the site. Treatments were approximately five acres, with the exception of the untreated control that was approximately one quarter to one acre. Isomate C+ was applied once by hand shortly after biofix at a rate of 400 per acre. This is approximately 8 per tree when the orchard is planted at 48 trees per acre. The CM-flowable, a sprayable pheromone, was applied at 30 grams a.i. (7.5 oz of product) per acre every 30-40 days starting just after biofix. Lorsban or Confirm was applied during the 1A or 2A flight determined by the farm advisor. *T. platneri* was aerially applied once per week for four weeks during the third generation of codling moth at a rate of 200,000 per acre. The number of applications were reduced to make the program economic for growers and to supplement codling moth control when the mating disruption product begins to age later in the season. Each orchard was monitored with traps weekly from biofix to harvest, and the trap liners were changed as necessary. Delta Traps were used and donated by Trece® along with the Longlife L2 lure (1X) and an experimental kairomone lure, temporarily called the DA lure. Each treatment block contained three delta traps, one hung low and two hung high in the canopy in the center of each treatment. In each of the pheromone treatments, the low trap contained the Trece® Longlife L2 lure, one high trap contained the Consep Biolure 10x, and the other had the experimental kairomone (DA) lure. The 10X Biolure and the sprayable pheromone were donated by Consep, Inc. The insecticide-only blocks and the untreated controls were monitored with the Trece® L2 lure positioned low and high as well as a trap with the (DA) lure. This protocol was followed because research has shown that the 10x lures (loaded with 10 times the pheromone) are not attractive to codling moth in non-mating-disrupted orchards. The lures were changed according to the manufacturers' instructions, with the L2 and DA lures lasting approximately 8 weeks and the 10x lure lasting about 4 weeks. Five trees were selected in the center of each treatment and

monitored for damage assessment throughout the season. These trees were used to monitor for the overwintering generation by nut drop, subsequent generations were monitored by canopy count, and the final evaluation occurred with a harvest sample.

**Objective 3: Demonstrate IPM strategies to control walnut blight, *Xanthomonas campestris*.**

Four of the participating blight site orchards were surveyed during the winter of 2000-2001 by collecting dormant walnut buds. Bioassays of these buds were conducted for the presence of walnut blight bacteria at Dr. Steve Lindow's laboratory at University of California, Berkeley for the percent of buds containing walnut blight bacteria and the amount of bacteria colony forming units (CFU) in the buds.

University of California Farm Advisors conducted uniform efficacy trials to evaluate reduced-risk approaches to controlling walnut blight at three of the four sites surveyed. The reduced-risk treatments include an eradicator spray containing copper and Manex (where registered), plus the wetting agent Break-thru applied only once at bud break. The PMA also tested the Xanthocast blight model developed by UC researcher Jim Adaskaveg with Manex and Copper treatment timed according to the model. There were 6 treatments total: (1) eradicator treatment only, (2) eradicator treatment + grower practice, (3) grower practice, (4) eradicator treatment + blight model, (5) blight model only, and (6) untreated. These treatments were followed uniformly across three sites and each location represents a replication for data analysis.

The materials used were 0.5% Break-thru by volume with the bud break spray, 8 pounds of fixed copper/acre with each grower standard spray plus 58 oz. Manex/acre (where registered) at 100 gallons per acre. Break-thru is a silicon wetting agent used to help carry the copper/Manex into the buds. An orchard air blast sprayer applied materials at bud-break and/or various other times during the spring.

**Objective 4: Demonstrate the impact of a replanted cover crop, a naturally reseeding cover crop, and native vegetation.**

The cover crops evaluated in 2000 were again evaluated in 2001 for plant species and biomass. The cover crop comparison was at the Yuba County PMA site. The site contained one planted cover crop treatment and a native vegetation treatment. The planted cover crop was manually reseeded in the winter of 1999 and was allowed to reseed naturally in the winter of 2000-2001. The evaluation took place in May 2001, four transects with 10 quadrats each were examined in the planted cover crop and also in the native vegetation. Each quadrat was a nested quadrat with dimensions of 0.25 m by 0.25 m and 0.5 m by 0.5 m. A biomass sample was taken at that time, as well.

**Objective 5: Monitor for additional walnut pests: mites, aphids, and walnut husk fly.**

Other important potentially economically threatening pests were monitored throughout the season. Pests such as mites, aphids, and walnut husk fly were treated as needed in some orchards

Trece Pherocon® unbaited yellow traps were used for monitoring walnut husk fly, *Rhagoletis completa*. Traps were placed high on the north side of the canopy and monitored weekly from July through harvest. The traps were baited with ammonium carbonate superchargers and changed every four weeks or as necessary. Monitoring of the walnut husk fly was done in, the Isomate block, the CM-Flowable block, the Confirm/Lorsban block, and the untreated check. Flies were collected from the traps and taken back to the laboratory for further study. They were examined to determine sex, and female flies were further inspected to determine if they were gravid. If females with eggs (gravid) were found, then it was recommended that an application of malathion plus bait be made within 7 to 10 days of finding gravid females.

Walnut aphid, *Chromaphis juglandicola*, sampling began in early June. The treatment blocks sampled were Isomate, CM-Flowable, Confirm/Lorsban, the grower standard, and the untreated check. Five leaflets from each of 20 trees at were selected at head height, and the lower side of the leaves inspected for walnut aphid and walnut aphid parasite, *Trioxys pallidus*. The number of walnut aphids and the number of aphid mummies were recorded. Samples were taken every other week until the population increased and then samples were taken weekly. If there was an average of 15 or more walnut aphids per leaflet, and no mummies, then a treatment was recommended. If many mummies were observed, then parasites may control the aphid population.

Dusky-veined aphids, *Callaphis juglandis*, sampling began in early June. The treatment blocks sampled were Isomate, CM-Flowable, Confirm/Lorsban, the grower standard, and the untreated check. The same leaf inspected for walnut aphid was used to determine dusky-veined aphid populations. Dusky-veined aphid populations were determined by counting colonies on a presence/absence scale. A colony consists of more than 5 aphids (nymphs or adults) on a leaflet. If 10% or more of the leaflets have dusky-veined aphid colonies, then a treatment should be considered for that block. Before treating, predators were noted in order to ensure a treatment would be necessary.

Pacific mite, *Tetranychus pacificus*, two-spotted mite, *Tetranychus urticae*, and European red mite, *Panonychus ulmi*, sampling began in June and continued one per week until a treatment decision was made. After a treatment decision was made, sampling continued every other week. The treatment blocks sampled were Isomate, CM-Flowable, Confirm/Lorsban, the grower standard, and the untreated check. In each treatment, 5 trees were selected, and 5 leaflets were picked low in the canopy and 5 leaflets were picked high in the canopy. The numbers of leaflets with mites were recorded on a presence/absence basis. Mite predators such as the western predatory mite, *Typhlodromus occidentalis*, and six-spotted thrips were recorded. If predaceous mites or six-spotted thrips are present on at least half of the leaflets that have mites, then natural enemies will control the population. If mite populations do not build up by the middle of August, then a treatment may not be warranted. The treatment thresholds for mites are:

- If an organophosphate or pyrethroid will be applied and no predators are present, then spray at 10% infested leaflets.
- If an organophosphate or pyrethroid will be applied and predators are present on 10% infested leaflets, then spray at 20% infested leaflets.

- If no organophosphate or pyrethroid will be applied and no predators are present, then spray at 30% - 40% infested leaflets.
- If no organophosphate or pyrethroid will be applied and predators are present at 20% - 25%, then spray at 40% - 50% infested leaflets.

**Objective 6: Assess the economic impact of a reduced-risk program as compared to conventional practices.**

Accurate economic data was collected on all materials evaluated, as well as whatever the grower used to control codling moth. Materials, rates of sprays, number of applications, and application costs were recorded. Many of these reduced-risk materials are not used as readily as conventional materials so at this time, the cost of reduced-risk materials can be higher than they may be in the future. However, recording the costs gives us insight into total and comparative costs until products become more widely used and as application methods become refined.

**Objective 7: Record pesticide use in commercial walnuts over a 10-year-time period.**

Data was compiled using the California Agricultural Statistical Service, Pesticide Use Reports from Department of Pesticide Regulation, and University of California IPM web site. This information is important in order to recognize pesticide use trends and can be used to determine how proactive growers can be in utilizing such reduced risk alternatives as *Bacillus thuringiensis* and tefenobucide.

## **RESULTS**

**Objective 1. Continue to build upon the Walnut Pest Management Alliance Team for implementation of reduced-risk strategies and extend the information to growers.**

The Walnut Pest Management Alliance Team has been proactive in implementing reduced-risk practices and keeping the information moving from farm advisors, to field scouts, and to the end users including growers, PCAs, and BIOS projects. Continuing to publicize the success of reduced-risk practices is the foundation for it to become more widely used. The PMA Management Team continues to drive the implementation and research required for adoption of these new practices. The Walnut Pest Management Alliance Management Team met January 25, April 6, September 28, and November 2 of 2001 to develop monitoring protocols, review data collected, plan educational programs, and to share ideas for the next season.

Field meetings and workshops are some of the ways information is extended to growers, cooperators, and interested allied industry. There have been four field meetings sponsored by the walnut PMA in 2001; one in the southern San Joaquin Valley, one in the northern San Joaquin Valley, and one in Butte County to demonstrate and show growers how to apply pheromone and how to use the new bisexual lure both in conventional and mating disruption settings. The fourth meeting was held at the Yuba site, and focused on cover crops. In addition, an instructional workshop about the walnut blight model, Xanthocast, was held in Yuba City. The PMA was a co-sponsor with CAFF of the codling moth symposium, held March 23, 2001. These meetings are attended by all of the partners including grower cooperators, walnut marketing board



research committee members, PCA's, BIOS representatives, and the local Diamond Walnut field representative. The results of this year's fieldwork were reported at the 34<sup>th</sup> Annual Walnut Research Conference in January 2002. An Update on Walnut PMA was presented at three walnut commodity meetings sponsored by farm advisors in Tehama County, Butte County, and Tulare County, all held in February 2001. Results from the Walnut PMA including an overview of alternative codling moth methods were discussed at a CAFF/BIOS meeting in March 2001. In all, information on the Walnut PMA was presented to 1321 clientele this year.

Results from the 2001 season were reported in the *Walnut Research Reports, 2001*, "Walnut Pest Management Alliance 2001: Year 3 Update". This report is published and made available to all walnut growers. Articles were written about the Walnut PMA in the California Walnut Commission's newsletters. Specifically, "Walnut Pest Management Alliance Concludes Year 2 with Positive Results", in the February edition, "Reduced Risk Orchard Management Package Emerging from PMA Trials" in the June edition, and "Walnut Pest Management Alliance Project Nearing Completion of Another Productive Year" in the November 2001 edition. These newsletters were sent to 5500 walnut growers and handlers. Janine Hasey and Terry Prichard have recently written a handout on covercrops in walnuts that can be used at outreach programs. In addition, this year the "Walnut PMA Web site" was created with the help of CAFF. It is linked directly, and can be accessed from the California Walnut Commission web site, <http://www.walnut.org>. The site includes background, news and information about the project, and current research projects, as well as links to other related sites.

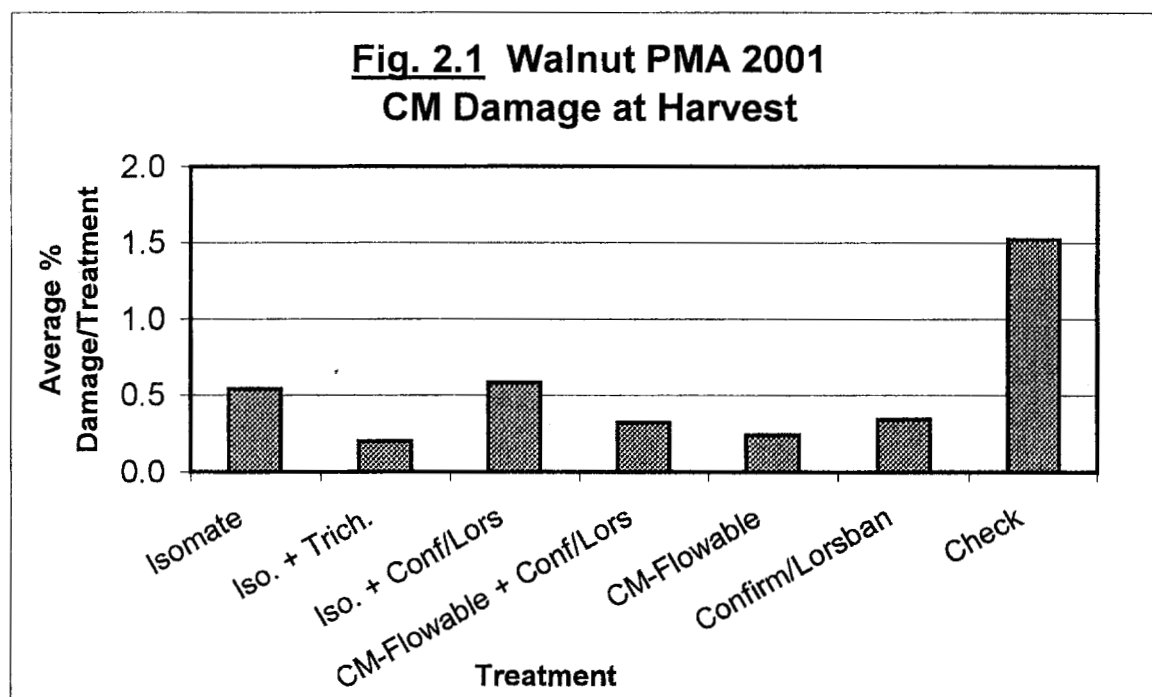
## **Objective 2. Demonstrate IPM strategies to control codling moth, *Cydia pomonella*.**

Nut drop and canopy counts are tools to aid in determining damage and levels after each respective generation, and the canopy counts have been good indicators of damage at harvest. Harvest damage is used to determine how well each treatment worked. The data from the Fresno site is reported, but was not used in the statistical calculations since there was no codling moth damage across treatments. Results are figured by how well each treatment controlled damage. Table 2.1 shows the average percent damage by treatment for each site and each treatment. Figure 2.1 depicts the average percent damage at harvest per treatment. All treatments are significantly different from the check at the 5% level.

Table 2.1. Damage at Harvest in each orchard and each treatment in the Walnut PMA 2001.

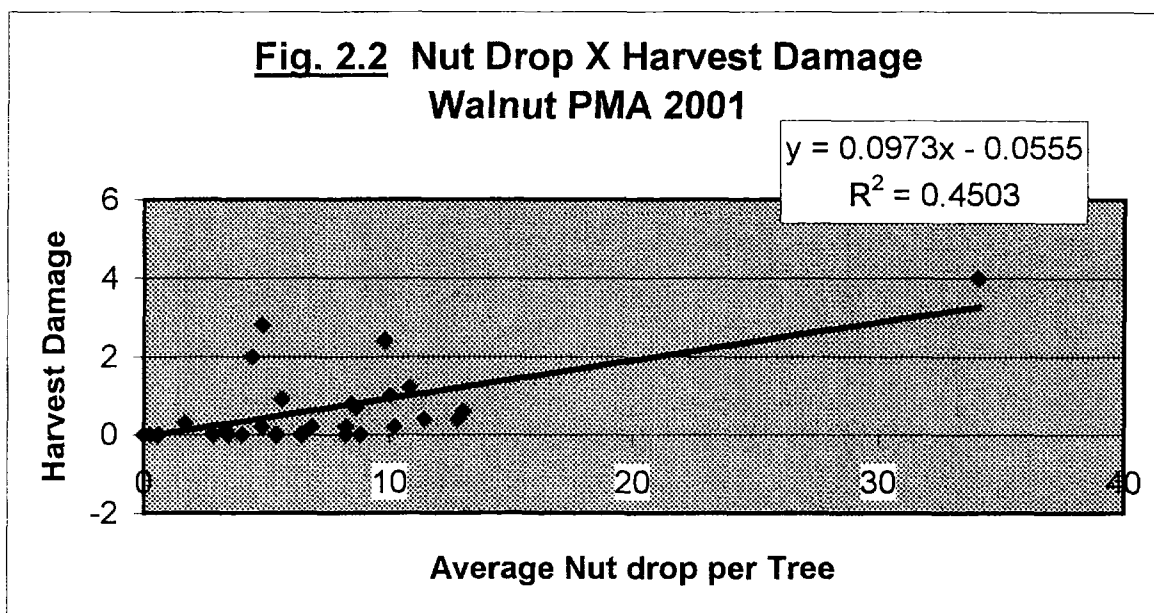
Treatment	Butte	Yuba*	Tehama	Fresno	San Joaquin	Average	St. Dev.
Isomate only	0.00	2.40	0.33	0.00	0.2	0.6	1.0
Isomate + Trichogramma platneri	0.20	0.60	ND	0.00	0.0	0.2	0.3
Isomate + Confirm	0.00	2.00	0.00	0.00	0.9	0.6	0.9
CM-Flowable only	0.40	0.80	0.00	0.00	0.0	0.2	0.4
CM-Flowable + Confirm	0.20	0.20	0.00	0.00	1.2	0.3	0.5
Confirm	0.00	1.00	0.00	0.00	0.7	0.3	0.5
Untreated Check	2.80	0.40	1.33	0.00	4.0	1.7	1.7

\*Used Lorsban instead of Confirm

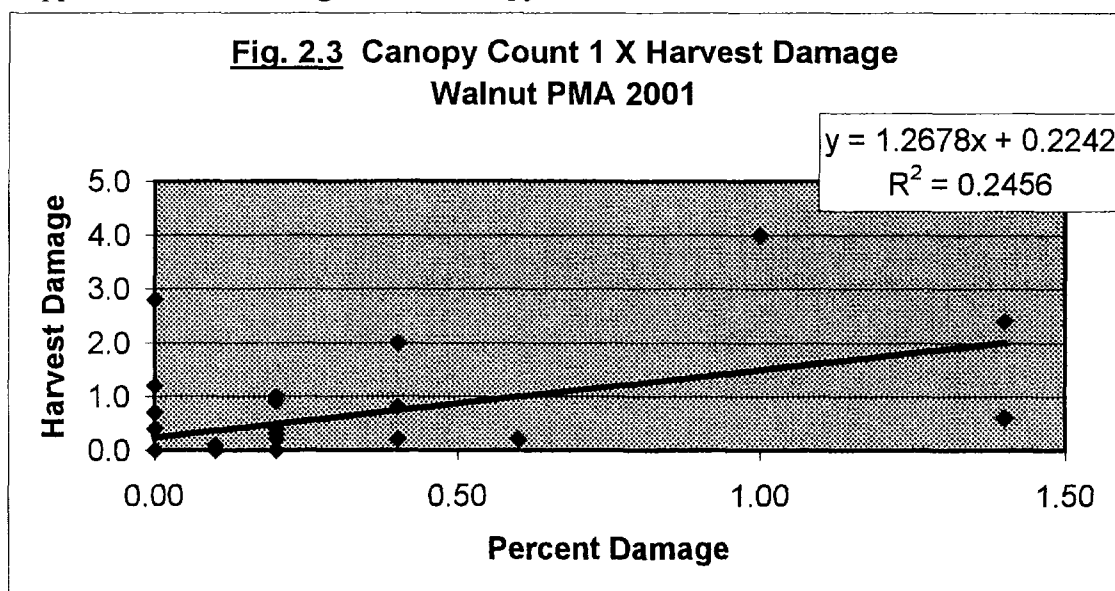


Monitoring techniques such as nut drop and canopy counts are tools used to determine damage levels at the end of each generation leading to harvest. Nut drop data is an analysis of the amount of damage from the first generation of codling moth. Correlations were calculated for each of these monitoring techniques to harvest damage in order to determine if harvest damage can be predicted from earlier generations. Data collected from all the treatments was used. Each orchard monitored the codling moth infested walnuts that dropped off the tree in the overwintering generation or first flight. In each treatment, five trees were selected in the center

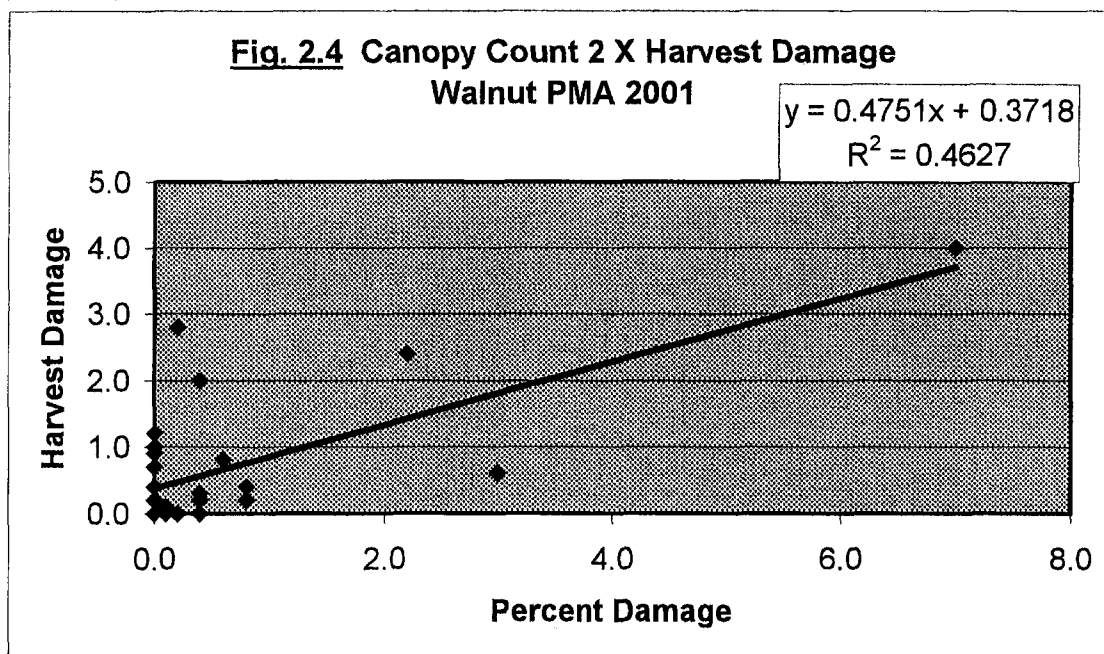
of the block and marked for use over the entire season. Weekly, the walnuts under each of these five trees were inspected for codling moth damage. The number of infested walnuts per tree from the overwintering generation are graphed against the final damage at harvest, resulting in a correlation of  $R^2=0.45$ , (Fig. 2.2).  $R^2=0.45$  is moderately correlated, and shows that 67% of the harvest damage could be accurately predicted using nutdrop.



Canopy counts were conducted in all six walnut PMA orchards using the same five trees chosen for nut drop. At the end of the overwintering generation, walnuts in the tree were inspected for codling moth damage. At each tree, 50 walnuts were randomly inspected low in the canopy and 50 walnuts were randomly inspected high in the canopy using orchard ladders for a total of 100 walnuts per tree, 500 walnuts per treatment. The correlation between the first canopy count and harvest damage is  $R^2=0.25$ , (Fig.2.3), which is not well correlated, because the damaged nuts dropped and were no longer in the canopy.



Canopy counts were conducted again at the end of the second codling moth generation, Canopy Count 2. They were conducted in the same manner, inspecting walnuts low in the canopy and high in the canopy, using the same trees as for nut drop and the first canopy counts. The correlation from the second canopy counts to the damage at harvest are noted below in Figure 2.4. The correlation calculated for the second canopy count to harvest damage has increased ( $R^2=0.46$ ) from the first canopy count and is a much better estimate of damage at harvest.



The monitoring tools of nut drop and canopy counts provide insight as to what is occurring in the orchard at that end of the generation and can be used to predict of damage at harvest and the need for treatment in the next generation. The nut drop is a reliable population predictor in warm years when the codling moth population drops from the tree and in cool years the first canopy count is the most reliable predictor of future damage.

**Objective 3: Demonstrate IPM strategies to control walnut blight, *Xanthomonas campestris*.**

Each orchard surveyed in the winter of 2000-2001 had some level of inoculum, as shown in Table 3.1 below. Although all the sites had inoculum present, the growing season of 2001 had environmental conditions that were not very conducive to walnut blight infection, resulting in very little blight pressure in the trials.

Table 3.1. Bioassay results from dormant walnut buds Walnut PMA 2001.

Site	Average Log CFU/Bud	% Buds Infested
Butte	0.79	20%
Yuba	0.71	22%
San Joaquin	0.31	10%
Fresno	0.14	3%

The Xanthocast walnut blight model's prediction of disease pressure ("blight index") was made available for no cost on the website [www.Fieldwise.com](http://www.Fieldwise.com). The blight index was checked daily for spray recommendations by researchers. This information was passed to the cooperating growers who treated the corresponding blocks as indicated by the model. These blight indices have decreased in the years with less rainfall.

Blight surveys were conducted in the three participating orchards on June 11, 2001 (The Fresno site was no longer participating at this time). One thousand nuts per treatment were visually inspected for symptoms of blight infection in the canopy. The results from the various treatments can be seen in Table 3.2. The values are expressed in percent walnut blight. With very little walnut blight present at any location, few conclusions can be drawn from this year's trial. There was no indication of a single best treatment program. To adequately evaluate these treatments, more severe walnut blight conditions need to occur and we need to have more sites.

Table 3.2. Percent walnut blight Walnut PMA 2001

Treatment Timing:	Butte	San Joaquin	Yuba	Mean *
Bud Break Only	3.37	5.3	1.8	3.49
Bud Break + Xanthocast Model	1.3	11.2	1.07	4.52
Xanthocast Model Only	4	0	4.22	2.74
Bud Break + Grower Standard	4.23	11.7	0.08	5.34
Grower Standard	0.49	2.5	2.9	1.96
Untreated Control	0.67	29	9.3	12.99

\*No significant differences at the 5% level.

**Objective 4. Demonstrate the impact of a replanted cover crop, a naturally reseeding cover crop, and native vegetation.**

The species present at the site are summarized in Table 4.1.

Table 4.1. Plant species present at the Yuba County Site

Grower Standard	Plant Category	PMA	Plant Category
blando brome	F	blando brome	F
burr clover	F	white sub clover	F
white sub clover	F	medic	F
Fescue	F	vetch	F
ranunculus	SW	pink nitro	F
sow thistle	SW	Crimson clover	F
foxtail	SW	Fescue	F
dandelion	SW	foxtail	SW
geranium	SW	sow thistle	SW
Polycarpon tetraphyllum, '4-leaf allseed'	SW		
blackberry	SW	ranunculus	SW
trefoil	SW	prostrate spurge	SW
prostrate spurge	SW	bur chervil	SW
Pineapple weed	SW	fillaree	WW
prickly lettuce	SW	Rye grass	WW
bur chervil	SW	annual blue grass	WW
Herniaria hirsuta ssp. 'Cinerea, 'gray herniaria'	SW	speedwell	WW
annual blue grass	WW		
fillaree	WW		
speedwell	WW		
chickweed	WW		
miner's lettuce	WW		
wild oats	WW		

Plant category: F = forage, WW= fall or winter weed, SW = spring or summer weed.

#### **Objective 5. Monitor for additional walnut pests: mites, aphids, and walnut husk fly.**

##### Walnut Husk Fly

Three of the six statewide orchards were monitored for walnut husk fly. Walnut husk fly monitoring occurred in Yuba, Butte, and Tehama counties. Traps were placed in early July only in those orchards with a known population or a history of walnut husk fly. Two mated females were found at the Yuba site on August 1, the entire orchard was treated with Malathion plus bait on August 2. None of the other sites were treated for walnut husk fly.

##### Aphids

Starting on 6/5, aphids were monitored every other week. Walnut aphid mummies were almost always present with their numbers usually more than double that of the live walnut aphids. This shows that the aphid parasites were controlling the populations. Dusky-veined aphid colonies were rarely seen. No orchard required a specific aphid treatment

#### Web-spinning Mites, European Red Mites, and Western Predatory Mite

Web-spinning, European red, and western predatory mites were monitored in four of the Walnut PMA orchards. Other predators were recorded as well, such as six-spotted thrips. Mite monitoring began in all orchards in June. Monitoring occurred every other week in most instances. Populations of web-spinning and predatory mites were recorded as present or absent on leaves. Treatment decisions were based on the percentage of leaves infested. The numbers mentioned below are the percentage of mite infested leaflets in the leaf sample taken. Fresno County sprayed a total orchard application of a miticide to control the population even though threshold levels were not reached. The Yuba County site reached as high as 80% of leaves sampled having mites, this was in the grower standard block. The Lorsban only block had 72% of leaves with mites. The grower applied a miticide to the entire orchard at the beginning of August. Butte County reached threshold levels in the Confirm only treatment (82%) and in the grower standard block (74%), but the numbers of predators increased weekly, and the grower decided not to spray. Tehama County did not apply any miticide treatment, even though the Isomate block had mites on 94% of the leaves sampled, and the Isomate + Confirm block had mites on 100% of the leaves.

#### **Objective 6. Assess the economic impact of a reduced-risk farming program as compared to conventional practices.**

For each of the seven orchards, the reduced risk treatment costs were the same. The treatments were: Isomate C+ alone, Isomate C+ and *T. platneri*, and Isomate C+ and Lorsban/Confirm, CM-flowable alone, CM-Flowable and Confirm/Lorsban, and Confirm or Lorsban alone. The Isomate C+ is a costly product and difficult to apply, but it is applied only once, at the beginning of the season. The Isomate C+ is applied at a rate of 400 ties per acre, approximately eight ties per tree. Application of the Isomate C+ is tedious and labor intensive, requiring the use of pruning towers in order to hang the product high in the canopy. The most experienced orchard, Yuba County, applied 15 acres of Isomate C+ with three workers in 10 hours. Therefore, to apply Isomate C+ to one acre would require one person 2 hours. The treatment consisting of the Isomate C+ and *Trichogramma* consisted of four aerial applications of *Trichogramma*. Of the five sites, four of them applied the sprayable pheromone, CM-Flowable, four times, and one site applied it five times. Table 6.1 reflects the more common usage, four sprays. The CM-F was applied at intervals ranging from 21 days to 55 days with the average application interval being 33 days. The treatment consisting of Isomate C+ and Lorsban or Confirm consisted of one or two sprays of the appropriate material.

Table 6.1. Costs per acre for materials used in the Walnut PMA 2001

Materials	Cost/acre	Rates
Isomate C+	\$110.00/acre	One time
<i>Trichogramma platneri</i>	\$15/acre	@ 200,000/acre
<i>Trichogramma platneri</i> x 4 apps.	\$60/acre	@200,000/ acre x 4 applications
CM-Flowable	\$60/acre	@ 30 a.i./acre
CM-Flowable x 4 sprays	\$240/acre	@ 30 a.i./acre x 4 sprays
Lorsban	\$22/acre	@ 4pints/acre
Confirm	\$22/acre	@ 16 oz/acre
Dipel	\$10/acre	@ 1 lb/acre
Omite	\$30-\$43/acre	@ 5lbs-7lbs/acre
Asana	\$17/acre	@ 1pint/acre
Guthion	\$34/acre	@ 3lbs/acre
Malathion	\$19/acre	@ 2 quarts/acre

The cost of some mating disruption products may change as the products become more widely used. In addition to the costs for materials, there are the costs for the equipment used in the applications and the cost of skilled labor. The equipment costs are listed below in Table 6.2. The hourly pay for skilled labor to use the pruning towers or the sprayer is \$9 per hour. With the addition of payroll taxes and insurance, the cost to the grower is \$12.06 per hour. These costs were all taken from "UC Extension Sample Costs to Establish a Walnut Orchard and Produce Walnuts, 2002". Russ Stocker provided the cost of the airplane application.

Table 6.2. Costs per acre for equipment & labor

Equipment	Cost/acre	Rates
Pruning Towers	\$21.56/acre	@ 2 hours/acre
Airblast Sprayer	\$15.57/acre	
Application by air	\$5/acre	

There were a wide variety of grower standard treatments. Not all the sites included a grower standard comparison treatment. Table 6.3 shows each grower standard costs and the average of the four sites that had as grower standard block. For comparison, the 2002 UC Cost Study for walnuts lists the costs for materials for insect control at \$87 per acre.

Table 6.3. Grower Standard costs including materials, labor and equipment for the Walnut PMA 2001.

Site	Costs/Acre
Butte	\$ 74.00
Fresno	\$84.00
San Joaquin	\$169.00
Yuba	\$157.00
Average (of PMA sites)	\$121.88



The total costs for all reduced-risk treatments are presented in Table 6.4 below. These figures include ALL costs, including materials, labor and equipment. The Confirm only treatment was not included because it was a partition treatment and not designed to provide season long codling moth control.

Table 6.4. Total costs of all treatments

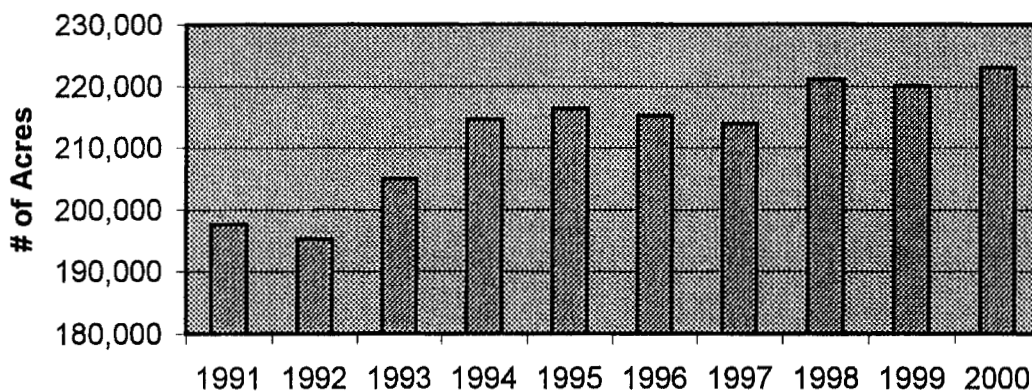
Reduced Risk Treatment	Total Cost
Isomate	\$ 132
Isomate + <i>Tichogramma</i>	\$ 212
Isomate + Confirm	\$ 170
CM-Flowable	\$ 304
CM-Flowable + Confirm	\$ 342

The cost of the Isomate C+ only treatment is comparable to the average cost of the grower standard. In the taller tree varieties and large blocks, it is not practical because of the length of time it takes to apply the material and the number of pruning towers available to growers. It is critical to the success of mating disruption that the material is quickly applied at first moth. However, it can be successful on small acreages and in younger trees. Growers that meet these criteria are starting to use Isomate C+. Now we need to develop an economic mating-disruption program for the taller trees and larger blocks.

#### **Objective 7. Record pesticide use in commercial walnuts over a 10-year-time period.**

The results presented in this section were acquired from the web sites of the California Agricultural Statistical Service, [www.nass.usda.gov/ca](http://www.nass.usda.gov/ca), and the California Department of Pesticide Regulation Pesticide use Reports [www.cdpr.ca.gov/docs/pur](http://www.cdpr.ca.gov/docs/pur). Walnut acreage has fluctuated over the last eleven years, resulting in a slow but steady increase. Figure 7.1 shows the total planted acres. Due to the fluctuation in the number of acres, organophosphate, pyrethroid, and *Bacillus thuringiensis* applications to California walnuts are summarized here as pounds per acre.

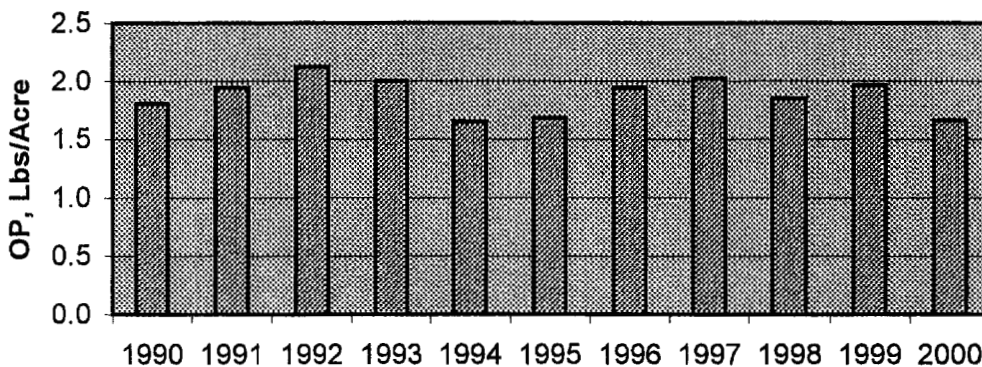
**Fig. 7.1 Acres of Walnuts in California  
1990-2000**



#### Organophosphate

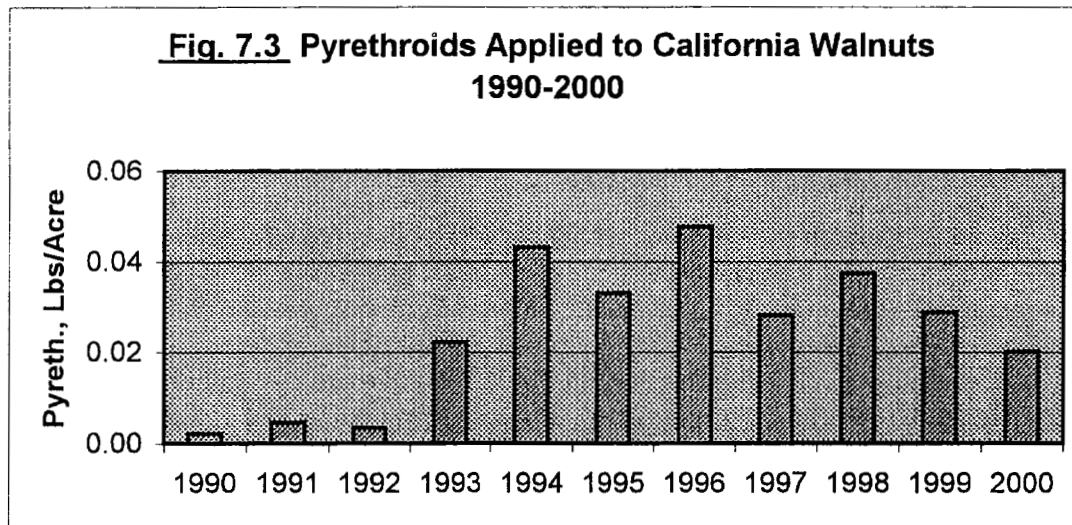
The organophosphates used to determine the following were: azinphos-methyl, chlorpyrifos, diazinon, malathion, methidathion, methyl parathion, naled, oxydemeton-methyl, phosalone, phosmet, phosphamidon, and phosphamidon related products. Statewide applications over the last eleven years are shown in Figure 7.2 below. The year 2000 had the lowest amount of organophosphates applied since 1994. The months with the highest amount of pounds applied per acre are May, June, July, and August. This correlates with the flights of the codling moth. This shows that growers applying these products are doing so in a time where there is potential or economic loss due to codling moth.

**Fig. 7.2 Organophosphates Applied to  
California Walnuts 1990-2000**



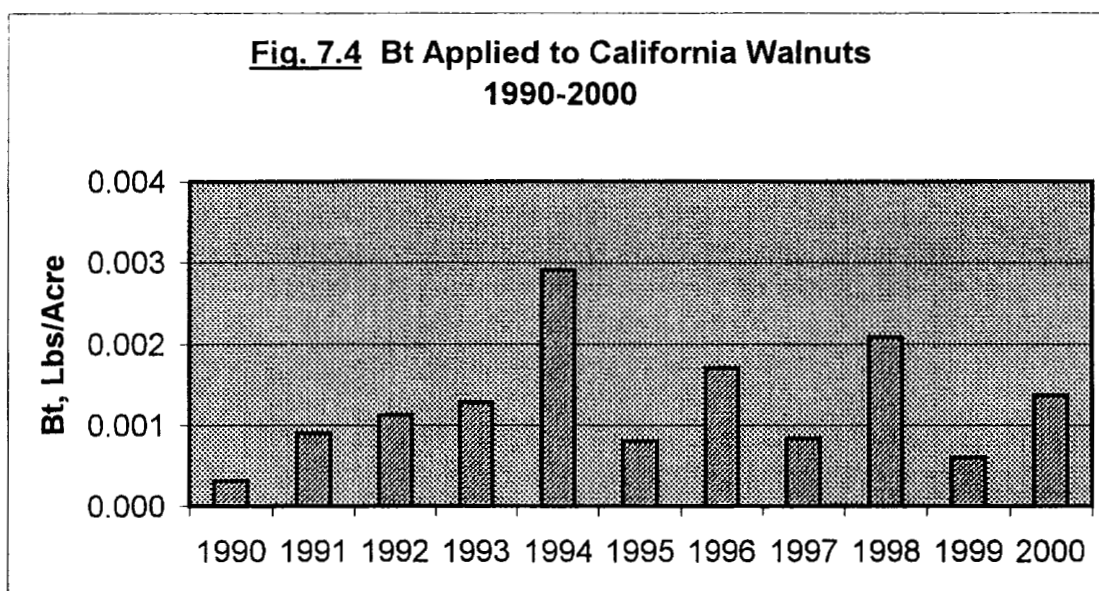
### Pyrethroid

Esfenvalerate and permethrin were the materials used in this section. Statewide applications are shown in Figure 7.3. The months of application are broader when using pyrethroids. For organophosphates, the months of application were clearly defined, however pyrethroids are used more consistently throughout the growing season. Beginning in April and ending in September, pyrethroids are applied.



### Bacillus thuringiensis(Bt)

In the Early 1990s, there was very little use of Bt. In 1994, there was a large increase in pounds applied per acre. Since then, Bt use seems to rise and fall in alternating years, but without reaching the peak usage of 1994 (Figure 7.4). The peak months of application are April, May, June, July, and August. These applications can be made for codling moth or red-humped caterpillar.



## DISCUSSION

The walnut PMA has maintained a strong alliance between the industry, UC researchers, UC farm advisors, BIOS partners, cooperators, and PCAs. Now that the alliance has developed reduced-risk practices that can be demonstrated, we plan to strengthen our relationships with growers through more outreach. The alliance has been instrumental in serving as a communication body between all groups interested in reducing the reliance of pesticides in walnuts. It has helped direct and attract research funded by the Walnut Marketing Board that is directly relevant to the needs of developing economic reduced-risk practices for growers. The farm advisors and BIOS project managers have been able to participate and keep abreast of the reduced-risk practices which they can quickly extend to their local BIOS and extension programs.

The walnut PMA outreach program includes publishing reports in the *Walnut Research Reports - 2001*, the Walnut PMA newsletter published three times in 2001, and setting up the walnut PMA web site. The walnut PMA newsletter is sent to all 5500 walnut growers through the walnut handlers. The *Walnut Research Reports - 2001* is distributed to growers on request. The results of the Walnut PMA demonstrations are presented at the farm advisors' commodity meetings, which were well attended, and the information on the emerging technology for pheromone application was well received. The PMA has been able to generate interest in using this technology. Information generated from the walnut PMA has been in trade journals.

At the November 8, 2001 field meeting in Butte County, attendees were asked to complete an evaluation. Although the event attracted almost 100 people, we received only 16 completed evaluations. More than half of the respondents had heard about the meeting through a farm advisor, with  $\frac{3}{4}$  of them saying the information provided at the meeting would be useful in their own orchards. More than  $\frac{3}{4}$  of those who responded felt that the topics had enough time for discussion, and that there was enough hands-on participation. Of the 16 survey participants, 10 said they would probably use a pheromone-based mating disruption product in the 2002 growing season, with half of those planning on using Isomate twist-ties, and the other half leaning towards the sprayable formulation.

The codling moth control component was successful with the easier-to-apply CM-Flowable making pheromone mating disruption more promising as an economically feasible option for walnut growers. To a large extent, codling moth can be controlled using pheromone, however, supplemental insecticides must still be used to bring down a very high population. However, long-term effects of a pheromone alone treatment have not been researched and results should be viewed with discretion. All treatment blocks except the untreated controls were under 2.5% codling moth damage at harvest, and many blocks had zero damage. All of the treatments were significantly different from the untreated control at the 5% level. Over the three-year period, the walnut PMA has also been able to validate a monitoring system for codling moth evaluation including nut drop, canopy counts, and a harvest sample. This technique will help growers decide when to supplement the mating disruption. The PMA has validated a trapping program for evaluating pheromone confusion using 1X and 10 X lures. The DA lures will be commercially available and the walnut PMA will be able to show growers how to use them to evaluate the efficacy of pheromone confusion. The PMA has demonstrated that hand applied

pheromone dispensers can be used alone in low codling moth population, supplemented with Confirm in medium populations and Lorsban in high population or unknown populations for the first year of using pheromone for codling moth control.

The blight demonstration program has moved along faster than originally planned with the Xanthocast Model becoming available to Sacramento Valley growers through Fieldwise.com funded by Griffin LLC. The walnut PMA held three training sessions on using the model to make decisions and how to use the Internet. The training was for the management team, Sutter/Yuba meeting and at a spring field meeting. As the walnut PMA trains growers on using XANTHOCAST, they are also validating the model at each of the blight demonstration sites statewide. In 2000, it had only been validated at one site in Tehama County. In 2001, the PMA had three uniform walnut blight trials across the state to evaluate it and to evaluate an early eradicator treatment developed by Dr. Lindow. The low incidence of rainfall resulted in low walnut blight damage with no significant differences between treatments. Numerically, the best treatment was the eradicator plus grower standard practice treatment at 2% blight. The poorest treatment was the untreated at 13% blight. In the Farmington demonstration, the treatment based on the model was able to save one spray with no increase in blight. Results look promising for growers to have a tool to help them reduce the number of applications for blight control.

One covercrop trial continues in Yuba County in 2001. A field meeting was held which 25 people attended. Results have shown that planting a winter annual self reseeding plot helped reduce winter weed problems, other trials have shown that it has increased water infiltration and decreased run-off. A fact sheet from the walnut PMA will be developed on using covercrops that can be handed out at meetings and posted on the walnut PMA web site.

## **SUMMARY AND CONCLUSIONS**

The objectives of the Walnut Pest Management Alliance are to comply with the FQPA regulations set in 1996 that may severely limit or ban traditional chemicals used to control pests in commercial walnuts. The Walnut PMA made great strides in its third year. By working with proactive walnut growers, the PMA has earned the trust of the grower/cooperator. By earning this trust, this research can occur in commercial orchards. Trust is important in building a positive relationship with growers so they will allow an unsprayed control treatment in their commercial crops.

Obstacles within the PMA project are:

- Mating disruption as a means of control requires labor intensive monitoring.
- Reduced risk required more intensive monitoring for all primary and secondary pests.
- The weather did not provide the correct environment to adequately examine walnut blight control.

The Walnut PMA benefits the walnut industry, the University, the walnut grower, and the environment. Through this program, we built cooperation among groups involved. We are educating growers and PCAs about reduced-risk practices, application techniques, and we have tracked economic data relating to conventional versus reduced-risk practices. We have begun to

see a decrease in broad-spectrum insecticides from both organophosphates and pyrethroids. Much of this decrease can be attributed to better monitoring that has been promoted by the walnut PMA. However, we would like to see a greater decrease with better adoption of pheromone confusion for codling moth control in walnuts.

Growers have been eager to learn at the field meetings and have turned out in great numbers. The field meetings provide useful information regarding farming issues. Growers have responded positively to the single field meeting.

Thus far, the Walnut PMA has formed partnerships with growers, industry and activist groups promoting pesticide reduction who are proactive and interested in reduced-risk farming practices. We have shown that damage levels are acceptable with implementing a reduced risk program on a small but growing amount of acreage in different walnut growing regions.

One of the most significant accomplishments of the walnut PMA is the strength of the management team and its ability to maintain these partnerships that are essential to the eventual success of reducing pesticides on walnuts. The walnut PMA has been able to attract additional researchers to the project since its inception. These include Dr. Steve Welter and Dr. Doug Light. The management team has attracted several parallel projects, which will greatly enhance the adoption of pheromone mating confusion in walnuts. One project is supported by the Center for Agricultural Partnerships and will have parallel demonstration projects statewide in the same growing regions and will pay PCAs to conduct the demonstration and the monitoring. This will be an important parallel project for including the PCAs, who have considerable influence on the ultimate user and can help ensure adoption of pheromone mating confusion with successful demonstrations. At the same time, they will be learning how to monitor the effectiveness of mating disruption so that growers do not have failures.

Parallel projects and new partners:

- Pat Weddle, Center for Ag Partnerships
- Fred Thomas, PCA
- L. Duane Lindsey, Walnut Marketing Board
- Tom Larsen, Suterra
- Justin Hill, Suterra
- Carla Thomas, Fieldwise.com
- Joe Schenone, Western Farm Service
- Scott Lingren, Trece

The walnut PMA has been able to reach their goals of incrementally demonstrating a successful mating disruption program and to see emerging application technologies become commercially available that will be much easier for walnut growers to use. The next phase of demonstration is to develop more information on using these sprayable pheromones economically. We have also been able to develop effective monitoring tools and to work with researchers to learn how to effectively use the kairomone lure, which will be commercially available in 2002. Overall, the Walnut PMA has been successful in showing the potential for reduced-risk farming and serving as the catalyst for expanded efforts now underway to demonstrate and encourage adoption of reduced-risk pest management strategies on walnuts.

# Project Summary Form 2001

## 1) Proposal Title

A Reduced-Risk Pest Management Program for Walnuts

## 2) Principal Investigator

Dennis Balint, Walnut Marketing Board

## 3) Alternative Practices

Pheromone mating disruption to control codling moth, vegetation management (i.e. cover crops) to suppress winter weeds, prevent erosion, prevent pesticide runoff, improve water infiltration, and increase biodiversity. Disease forecasting and other IPM strategies to control walnut blight.

## 4) Summary of Project Successes:

Mating disruption materials have been shown to provide effective control of codling moth statewide, including the newer sprayable formulation. Replicated treatments statewide allow statistical analysis of results. PMA has built a positive relationship with growers who allowed unsprayed controls in their commercial orchards. Research has developed and demonstrated a walnut blight forecast model.

## 5) Number of Participating Growers: 9

## 6) Total Acreage in Project: 134

## 7) Project Acreage Under Reduced Risk: 101

## 8) Total Acres of Project Crop: 8000

## 9) Non-Project Reduced Risk Acres: 0

## 10) Number of Participating PCAs: 9

## 11) Cost Assessment: Total costs: (includes material, equipment and labor)

Reduced Risk Treatment	Total Cost	Grower Standard	Total Cost
Isomate	\$ 132	Butte	\$ 74
Isomate + <i>Tichogramma</i>	\$ 212	Yuba	\$ 157
Isomate + Confirm	\$ 170	Fresno	\$ 84
CM-Flowable	\$ 304	San Joaquin	\$ 169
CM-Flowable + Confirm	\$ 342	Average	\$ 121

## 12) Number of Field Days: 4

## 13) Attendance at Field Days: 190

## 14) Number of Workshops & Meetings: 9

## 15) Workshop Attendance: 1321

## 16) Number of Newsletters: 3

## 17) Number of Articles: 4

## 18) Number of Presentations: 6

## 19) Other Outreach Activities: 5

BIOS, CSU Chico, Ag Partnership Conference, Walnut Research Conference, and Pomology Extension Continuing Conference

FOR OFFICIAL USE ONLY Contract Number Project ID

DPR ID# Contract Manager 25th June 2001 Version

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## **APPENDIX A**

**WALNUT PMA MANAGEMENT TEAM MEETING AGENDAS FROM  
DECEMBER 1, 2000, APRIL 6, SEPTEMBER 28, AND NOVEMBER 2, 2001.**

**Walnut PMA  
December 1, 2000  
UCCE Office, Stockton, CA  
9AM – 2PM**

**CodlingMoth**

9 AM – 11 AM

Summary of Codling Moth Treatments at PMA Sites (20 minutes) – Carolyn Pickel

**Research Result Summaries and How it effects the 2001 PMA Treatments (15 minutes each)**

Pheromone Confusion Research - Steve Welter

DA Lure Research Summaries – Doug Light

IGR's Research – Bob Van Steenwyk

Biocontrol and Varietal Research Results – Nick Mills

Develop Plan for 2001 Codling Moth Treatments (30 minutes) – Steve Welter

**Walnut Blight**

11:15 - Noon

Summary of 2000 Blight Treatments – Bill Olson and Rick Buchner

Blight Plan for 2001 PMA Sites – Bill Olson and Rick Buchner

LUNCH Noon – 12:30

**Cover Crops, Nutrient Cycling and Orchard Floor Management**

Review the PMA program (45 minutes) – Terry Prichard, Joe Grant, and Molly Espley

**Walnut IPM Continuum**

Review the IPM practices for the Smith Lever Survey on the Walnut IPM Continuum (30 minutes) – Carolyn Pickel

## **WALNUT PMA AGENDA**

**APRIL 6, 2001  
9:30 AM to 1:30 PM**

Introductions

Pesticide Use Reports: Measure of Impact –Carolyn Pickel

Codling Moth Update - Carolyn Pickel and Steve Welter

Blight Update - Bill Olson and Rick Buchner

Cover crop Update - Terry Prichard

Secondary Pest Sampling Update - Carolyn Pickel

Outreach program - Carolyn

Newsletters - Molly

Internet(Walnut Marketing Board) - Molly

Field Meeting -Molly

Better Communication Through the Internet - Carolyn and Joyce Strand

Coordinate Publication efforts - Carolyn

**AGENDA  
Walnut PMA Meeting  
09/28/01**

**Introductions**

**Review Walnut PMA Goals – Carolyn Pickel and Dave Ramos**

**DPR Recommendations for Work Plans – Bob Elliot**

- **Measures of Success**

**Develop Work Plan for PMA**

- **Codling Moth –Steve Welter and Carolyn Pickel**
  - **Short Review of 2001 results**
  - **Applied Research Sites**
  - **Demonstration Sites –**
  - **Outreach Plans**
- **Blight – Bill Olson and Rick Buchner**
  - **Short Review of 2001 results**
  - **Applied Research Sites**
  - **Demonstration Sites –**
  - **Outreach Plans**
- **Cover crops – Terry Prichard, Janine Hasey and Joe Grant**
  - **Short Review of 2001 results**
  - **Demonstration Sites**
  - **Outreach Plans**

**View Codling moth trap data on the web.**

**<http://www.ipm.ucdavis.edu/PM/>  
member name: WCMmem  
password name: Memvina**

**Walnut PMA Meeting  
Review Data 2001  
11/2/01**

**Objectives – Carolyn Pickel**

- 1) Do we have enough data to say sprayable pheromone works for CM in walnuts?
- 2) Review Welter's research
- 3) How to use the DA lures to evaluate mating disruption?
- 4) Develop a plan to analyze DA data
- 5) Review Blight Data

**Walnut Blight Data – Bill Olson**

**Codling Moth Data from PMA – Carolyn Pickel**

**Pheromone Research Data – Steve Welter**

**DA Lure data – Doug Light**

- 1) How does using DA lures help us time sprays
- 2) How can DA lures be used in determining if mating disruption is working
- 3) How does DA lures relate to damage levels in a block
- 4) Is male emergence delayed in a mating disruption block as monitored by DA lures. In the blocks I have been watching I notice that the male and female emergence is at the same time in a mating disrupted treatment. In the non MD blocks, the male emergence appears to be early. Have you seen this?
- 5) The mating disrupted treatments seem to have the same % mated as the non MD blocks.

**DA Lure Data Analysis for the PMA data – Carolyn Pickel**

## **APPENDIX B**

**WALNUT PMA 2001 PROTOCOLS FOR CODLING MOTH, WALNUT  
BLIGHT, WALNUT HUSK FLY, APHIDS, AND MITES.**

**Walnut PMA 2000  
Codling Moth Protocol  
5/23/01**

**Carolyn Pickel, Walt Bentley, Bill Olson and Steve Welter**

Description:

35 feet tall  
Vina or Ashley variety  
Treatments minimum size of 5 acres except untreated control  
Untreated control should be at least ½ acre

Treatments:

Grower Standard (Sample at harvest only)  
Untreated control  
Isomate C+ only  
Isomate C+ + Trichogramma (4 weekly applications for 3rd generations)  
Isomate C+ + 2 Confirm sprays at 1B and 2A (Low population) or  
Isomate C+ + 2 Lorsban sprays at 1B and 2A flight (High population)  
Consep sprayable + 2 Confirm sprays at 1B and 2A (Low population)  
Consep sprayable + 2 Lorsban sprays at 1B and 2A flight (High population)  
Confirm/Lorsban only - sprayed on same schedule

Standard Monitoring:

Trece Delta traps  
L2 lures for 1X monitoring – change every 8 weeks  
Consep Biolure for 10X monitoring –change every 4 weeks  
DA lure – change every 8 weeks  
Check traps every 2 days to determine biofix  
Check traps weekly after biofix  
In PMA treatments using Pheromone combinations (one ser of traps per treatment):  
    1x LOW in canopy  
    10x HIGH in canopy  
    DA Lure High in canopy  
Untreated control and Confirm/Lorsban only:  
    1x LOW and HIGH in canopy.  
    DA lure High in canopy

Nut Drop:

This is to evaluate control of the first generation of codling moth from the overwintered generation or first flight. Begin to monitor dropped walnuts when there are walnuts on orchard floor, approximately end of May to end of June. Mark 5 trees on the middle row in the middle of the block. Choose every 3<sup>rd</sup> tree. These trees will be used for canopy counts and harvest samples. Collect all the nuts dropped under each tree weekly and examine them for codling moth damage. Record the number of codling moth by tree each week. (Do not count the total number of nuts that drop per tree just those damaged by Codling moth.) At the end of the drop record the number

of CM infested dropped nuts per TREE by treatment. This can be confirmed in cool years when codling moth attacked nuts do not drop with a canopy count that can be done at the end of first flight.

Recording Canopy Count Damage:

Use the trees marked for nut drop. A 100 walnut sample should be taken, 50 walnuts high and 50 walnuts low in canopy using the same nut drop sample trees. Record percent damage in husks and meats separately. Canopy Counts (2<sup>nd</sup> and 3<sup>rd</sup> generations) are conducted at the end of each generation, 1060 DD to 1200 DD depending on generation.

Harvest Sample:

Collect 100 nuts at random from marked trees in each treatment after the tree has been shaken. Record codling moth damage by husk and meats.



**Walnut PMA 2000  
Blight Protocol  
5/23/01  
Bill Olson and Rick Buchner**

**Dormant Bud Samples**

The 7 PMA sites should be sent in to Dr. Lindow. The Sacramento Valley (3), Northern San Joaquin Valley(2), and the Southern San Joaquin Valley(2).

**If you send samples in you are obligated to get a blight reading in late May or early June (see protocol below).**

Collection of buds: (January or February):

Send in a TOTAL of 100 buds from each site.

Notify Dr. Lindow BEFORE sending bud samples. His e-mail is:

[icclab@socrates.berkeley.edu](mailto:icclab@socrates.berkeley.edu).

**Eradicant Trial**

RNA and Breakthru is the same material and either may be used.

**Treatments:**

- Grower standard (any size)
- Bud-break only is optional (up to 2 acres)
- Bud break + grower standard (up to 2 acres)
- Bud-break + model
- Model only
- Check – if possible, 10 trees

**Rate of Application**

For the bud break spray, the rate is 0.5% by volume (ex. 64oz/100). The bud break spray is one of two options. One option is RNA or Breakthru + copper/Manex. The second option is RNA or Breakthru + copper alone if Manex is not allowed.

**TAGGING NUTS IN THE WALNUT PMA BLIGHT CHECK PLOT**

1. Use red tags (easy to find in tree)
2. Number tags 1 through 50 - both sides of tag
3. Hang tags over paired flowers using half hitch. Thus you have 100 flowers tagged. You can do this all on one check tree or several. Hang trees above influence of any sprinkler irrigation. You will need a short ladder to hang trees and read results.
4. Monitor tags once a week through the week of June 10.
5. Record clean flowers-nuts (C); Blighted flowers-nuts (B); and missing flowers-nuts ((g) (for gone)). Thus on your data sheet for each weeks date and each tag you would have data like CC, BC, Bg, BB, gg etc indicating if the two flowers-nuts/tag were blighted, clean, or missing. Any "shadow appearance" on the flower-nut might be the first sign of blight so record it as a B. If it doesn't materialize over the next 2-3 readings then it was clean (C) and you can go back and adjust your earlier recording. On the other hand if you record it as B and in the next week or so it becomes more obvious that it is blight or is gone, the early B recording was most likely correct. It is important to record blight (B) as soon as it is present. That's the whole point of this exercise, i.e. to identify the earliest possible indication of blight

6. For this project I would make weekly recordings through the week of June 10.
7. After the final reading calculate the % of blighted flowers-nuts that was present each week by dividing the number of blighted flowers-nuts present each week by the total flowers-nuts available for that week. The total flowers-nuts available will start out as 100 but will be less as time goes on.

Blight Evaluation:

Take walnut counts from late May to early June before nuts start dropping, this can coincide with the first canopy count. Look at 100 nuts per tree on 10 trees per treatment (1000 walnuts/treatment). Any incidence of blight, no matter how small, is recorded as having blight. Record data and provide a copy to Bill Olson.

**If you accept Breakthru or RNA then you are obligated to get a blight reading in late May or early June.**

**NOTE:**

Each individual Farm Advisor is responsible for filing appropriate paperwork for application of material and submitting own plot map. RNA may have a new label by bud break. If they do, then no experimental use permit will be needed. Bill Olson will see that you each get two gallons of either RNA or Breakthru. Let Bill Olson know if you want to participate in the Eradicant Trial so he can line up product.

**Walnut PMA  
Walnut Husk Fly Protocol  
5/01  
Nicole Darby, Carolyn Pickel and Bill Olson**

Trap Placement and Baited:

- Traps should only be monitored in orchards with potential populations that may cause damage
- One trap in the following treatments
  - Isomate
  - sprayable
  - Confim/Lorsban
  - untreated check
- Traps out in mid to late June unless it is known if populations emerge earlier.
- Traps hung high in tree canopy of the north side.
- Traps baited with vials of ammonium carbonate. Ammonium carbonate to be changed once every 3 weeks or as necessary. Heat and summer rains may deplete ammonium carbonate in the vials.
- Change yellow trap as needed.

Monitoring:

Check weekly.

Take flies off traps weekly and determine gender.

Record when finding gravid females and notify Area Advisor and Farm Advisor.

It is usually easier to take flies back to laboratory to determine gender and if females are gravid. Using card stock or manilla folders cut in half, line edges with double-sided tape. Place Saran wrap or Glad wrap on top so that it covers the entire folder and sticks to the tape. Label headings appropriately.

Determining Gender of WHF:

With a pointer, take flies off trap, place on folder, and cover with wrap. Under a microscope, the male flies will have black legs (first segment of leg) and a rounded-abdomen. The females will have all yellow or brown legs and a pointed abdomen.

Determining Gravid Female WHF:

At the same time as determining the gender of flies also check for gravid females. When a female is determined, take a pointed object and press on the abdomen. If small, white, oval shapes are found, then she is gravid. These structures may resemble grains of rice. As the season progresses, this process will become easier. The females will have large abdomens and appear bloated.

Treatment:

Spray 7 days after gravid females are found with Malathion at the highest rate and bait.

**Walnut PMA 2000  
Aphid Monitoring Protocol  
Draft 5/17/01  
Bill Olson, Carolyn Pickel and Walt Bentley**

**Treatments Sampled**

- Isomate
- sprayable
- confirm/lorsban
- grower standard
- untreated check

**Sampling Procedures**

Begin sampling in May

Sample at head height or the lowest part of the canopy you can reach

Take a random sample every two weeks until population increases and then weekly.

Sample 5 leaflets (take a sub-terminal leaflet from mature leaflets behind nuts) from **10** trees for a total of **50** leaflets from each treatment

Record numbers of walnut aphids and mummies from the lower side of leaflets

**Walnut Aphid Threshold**

If the average number of healthy aphids found on the underside of sub-terminal leaflets of is over 15 per leaflet, then consider treatment for walnut aphid. Check to see if parasites are keeping pace with the walnut aphid before calling for a treatment. If there is 1 mummy per 10 aphids then sample again before treated to see if number of mummies is increasing.

**Dusky-veined Aphid**

Sample upper side of leaf along the mid-vein

Use the same leaflet used for walnut aphid

Record PRESENCE/ABSENCE of Dusky Vein Aphid

**Dusky-veined Aphid Threshold**

If 10% or more of the leaflets have aphid colonies, then a treatment should be considered for that block. Treatment is not recommended in blocks that do not reach this threshold.

Few mummies will be present with DVA. However, predators can keep DVA below threshold.

Be sure DVA predators are not controlling DVA before calling for a treatment.

**Control Measures**

In PMA treatment blocks apply June to August at rate of 4 gallons of oil at 200-400 gal/acre.

Discuss control with management team because oil can interfere with codling moth efficacy.

**Walnut PMA 2000**  
**Mite Monitoring Protocol**  
**Draft 5/01**  
**Bill Olson, Carolyn Pickel and Walt Bentley**

**Treatments Sampled**

- Isomate
- sprayable
- confirm/lorsban
- grower standard
- untreated check

**Pacific Mite and Two-Spotted Mite – Webspinning Mites**

Begin looking in June or early July and continue once per week until treatment decision is made. Samples taken biweekly after treatment decision.

Colonies will be seen on underside of leaflets but may also be found on upper surface when populations are high.

**MONITORING (2 Methods)**

**Determining Mite Populations by Examining TREES**

Check all trees in hotspots such as edges of orchard, near roads, and dust, not individual leaflets.

Sample **10 TREES** for brown-clusters suggesting mite-damaged leaves per treatment block in “hot spots”. Colonies usually begin in the upper southeast quadrant of trees but look at the entire tree.

Examine leaves from these brown/bronze clusters AFTER evidence of mite (i.e. brown/bronze clusters) populations are suspected.

Pick infested leaflets high in the canopy and check for the presence of predators. If brown clusters of leaves confirmed as mite damage are present on 10% of the trees and no predators are present, then treat the orchard for mites.

**Determining Mite Populations by Examining LEAVES**

Sample **5** leaflets at random from **10** trees examined for tree method in each treatment  
Record presence of webspinning mites.

Record presence of predator mites and six spotted thrips

**Monitoring for Predators To Determine Treatments**

If predaceous mites or sixspotted thrips, are present on at least half of the leaflets that have mites, then natural enemies will probably control the population. Monitor again in 3 or 4 days to determine if the webspinning mite population is building or declining. If weather is warm, monitor in 3 days, the pest mites may build up faster than the predator populations. If mites do not build up in walnuts by mid-August, then a treatment may not be warranted.

**Thresholds**

- If op/pyrethroid will be applied and no predators present spray at 10% infested leaflets
- If op/pyrethroid will be applied and predators present on 10% infested leaflets spray at 20% infested leaflets.

- If no op/pyrethroid will be applied and no predators present spray at 30 - 40 % infested leaflets
- If no op/pyrethroid will be applied and predators are present at 20 – 25% spray at 40 – 50% infested leaflets

#### Walnut European Red Mite

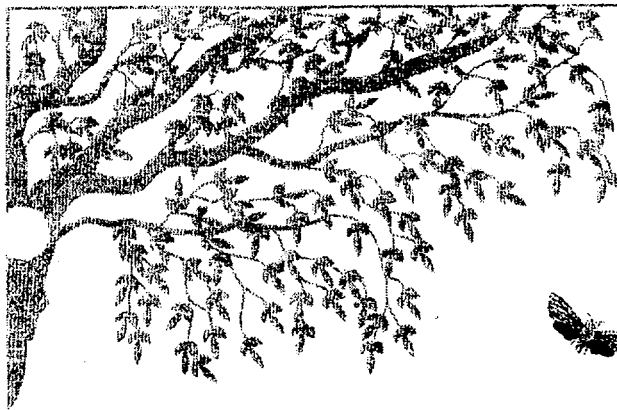
Follow same protocol as for webspinning mites.

Record ERM presence/absence.

Avoid treating low to moderate populations of European red mites because they can be important in maintaining predators.

## **APPENDIX C**

**WALNUT PMA FIELD MEETING ANNOUNCEMENTS FROM MARCH 23,  
MAY 31, SEPTEMBER 10, AND NOVEMBER 8, 2001.**



*Join Community Alliance with Family Farmers for a*

## **Codling Moth Symposium**

A focus on Reduced Risk Practices for  
Controlling Codling Moth in Walnuts

Friday, March 23, 2001  
8:30-12:30 p.m.  
Sierra Orchards  
9264 Boyce Road, Winters

### **Topics and Speakers**

**An Overview of Reduced Risk Practices for Controlling Codling Moth**

*Carolyn Pickel, Area IPM Specialist*

**Pheromone Mating Disruption in Walnuts**

*Steve Welter, Entomologist, UC Berkeley*

**Aerial Trichogramma Releases**

*Russ Stocker, Arena Pest Management*

**Panel Discussion: Experiences with Reduced Risk Practices**

**The Importance of Monitoring in a Reduced Risk System**

*Carolyn Pickel, Area IPM Specialist*



*For more information  
Call Molly Johnson,  
(530)756-8518 ext. 30*

*This event is co-sponsored by the Walnut Pest Management Alliance & funded by EQIP.*





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# ORCHARD NOTES

MAY 2001

**WALNUT PEST MANAGEMENT ALLIANCE COVER CROP FIELD DAY**  
**THURSDAY, MAY 31, 2001, 10:00 AM - NOON**  
**DESERET FARMS, YUBA COUNTY**

## TOPICS AND SPEAKERS:

- UPDATE ON PEST MANAGEMENT ALLIANCE PROJECTS  
*BOB ELLIOTT, DEPARTMENT OF PESTICIDE REGULATION*
- WALNUT PMA COVER CROP TRIAL RESULTS  
*JANINE HASEY, SUTTER/YUBA COUNTIES FARM ADVISOR*
- GROWER EXPERIENCE WITH A PLANTED COVER CROP  
*MIKE BENNETT, WALNUT GROWER*
- COVER CROP BENEFITS AND PROPER IRRIGATION SCHEDULING TO IMPROVE EFFICIENCY AND SAVE MONEY AND POWER  
*TERRY PRICHARD, UCCE IRRIGATION SPECIALIST*
- IMPACT OF A COVER CROP ON REDUCING SPRAY RUNOFF  
*BILL KRUEGER, GLENN COUNTY FARM ADVISOR*
- XANTHOCAST - A PREDICTIVE MODEL FOR WALNUT BLIGHT  
*CARLA THOMAS, PLANT PATHOLOGIST, FIELDWISE*
- UPDATE ON THE WALNUT PMA WEB SITE  
*WILL STOCKWIN, CAFF MEDIA COORDINATOR*

**1 HOUR OF PCA CREDIT HAVE BEEN  
REQUESTED  
(INCLUDES ½ HOUR OF LAWS)**

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San Joaquin

# Pomologist

po•mo•lo•gy\ po malej\ n [fr. L. *pomum* fruit +  
*logia* - logy study] 1: the science of the cultivation  
of fruits 2: the science or practice of growing,  
storing, processing and marketing fruits

University of California Cooperative Extension

420 South Wilson Way, Stockton CA 95205-6299 (209) 468-2085

## Walnut Growers Field Meeting

Monday, September 10, 2001

10 a.m. – 12 noon

Chiappe Farms, Farmington, CA

### *Alternative Strategies for Codling Moth Control*



# Walnut Notes



Volume 30 ■ October 2001

October 2, 2001

Prepared By:

*Bill Olson*  
Bill Olson, Farm Advisor

## IN THIS ISSUE

### Walnut Codling Moth Field Meeting

**When:** November 8, 2001, 9:30 a.m.**Where:** Deseret Farms, Chico Ranch - Very End of Wilson Landing Road, Chico**Agenda:**

- Overview of the Walnut Pest Management Alliance Project  
Bob Elliott, Associate Environmental Research Scientist, DPR
- Why Consider Alternative Pest Control Measures?  
Bob Voorhees, Supervising Agricultural Biologist
- Results from 2001 Codling Moth Trial  
Carolyn Pickel, UC IPM Advisor
- Codling Moth Monitoring Techniques  
Bill Olson, UC Farm Advisor
- A Lure to Attract Female Codling Moths?  
Doug Light USDA Research Entomologist
- Mating Disruption Methods & Applications
  - Pheromone Ties  
Carolyn Pickel, Bill Olson
  - Aerial Application of Pheromone  
Russ Stocker, Arena Pest Management
  - Sprayable Pheromone & Puffers  
Justin Hill, Consep Technical Sales Representative

**Sponsored by:****University of California Cooperative Extension  
Walnut Pest Management Alliance**

2.5 Hours of Continuing Education Credit Requested

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## **APPENDIX D**

### **WALNUT PMA COVER CROP HAND OUT.**

## COVER CROPPING IN WALNUT ORCHARDS

Terry Prichard, Water Management Specialist UC Davis  
Janine Hasey, Farm Advisor, UC Cooperative Extension Sutter Yuba County

Once harvest season is completed, there is a short window of time to plant cover crops. Plans should be made now so that seed and equipment is available to beat significant rainfall and leaf drop.

### What is a cover crop?

A cover crop is a non-economic crop grown in the middles between orchard rows with sprayed strips. Cover crops can be annuals, which germinate and die in one season, or perennials that live for more than one year. Both legumes and grasses are available as annuals or perennials depending on species. Additionally, both winter and summer weeds can be allowed to grow and managed like a cover crop.

### Why do growers use cover crops?

The appropriate use of cover crops can result in substantial benefits to the cultivated walnut crop itself and/or can cause potential problems. One hopes the benefits outweigh the problems. Since both the benefits and problems can be site and management specific it is good to review them before planting.

### Benefits

The most universal reason for using cover crops is to **reduce soil erosion**. The established plant roots hold the soil against the forces of moving water. Established cover crops have been shown quite effective in controlling erosion on slopes as well as river bottom soils during flooding.

**Biomass production** or the production of plant tissue both above and belowground can be beneficial in both a nutrient and soil quality perspective. A good stand of planted annual cover crop can produce 5000 pounds per planted acre of aboveground dry matter per season. Add to that the root mass, and the total biomass can be near 7500 pounds/planted acres.

In terms of nutrients, **cover crops extract left over nitrogen** from the orchard; take up mineralized nitrogen from organic matter and in the case of legumes (such as clovers and vetch) extract nitrogen from the atmosphere. Legumes generally produce twice the nitrogen per pound of dry (3%) matter than grasses (1.5%). Therefore a 5000-pounds/acre dry matter cover crop can produce up to 75 – 150 pounds of nitrogen depending on the species mix. In order to utilize all this nitrogen, the cover must be incorporated into the soil usually by disking. In contrast, mowing the cover along with subsequent irrigation will cause some (a lot) of the nitrogen to be lost to the atmosphere. Cover crops which are not incorporated but mowed have not been shown to replace the application of fertilizer to meet the nitrogen requirement.

Cover crop living vegetation and biomass derived from cover crops **protect the soil surface** from the damaging effects of raindrops and equipment. With the cover crop drying up soil by using water during the winter and covering the surface, orchard access is enhanced. Ruts from equipment are much less of a problem. As the biomass decomposes into primarily polysaccharides (long chain sugar products), they bind soil particles together **stabilizing the soil aggregates** against the effects of sprinkler and rain droplets and other soil compacting/crusting forces. Aggregate stabilization along with the channels created by roots enhance the soil's **water infiltration characteristics**.

By using moisture from the soil during the rainy season, room for more water to infiltrate the soil is made. So when a rainfall event occurs more of the water infiltrates rather than becoming run off which **can reduce off-site movement of pesticides.**

Cover crops can **reduce undesirable weed species.** In the walnut pest management alliance(WPMA) plots, the cover crop established well and reached maturity at both sites, allowing for reseeding. The number of winter weed species and their dry weight were significantly decreased in the cover crop plot versus the resident vegetation plot. Although the occurrence of spring or summer weeds overall was not significantly different between the plots, certain weeds such as burr buttercup were dramatically reduced where there was a cover crop. Other species such as hairy fleabane were found at low levels only in the unseeded plots and not found in the cover crop blocks.

### **Potential Problems**

As with any cultural practice, there are drawbacks to the use of cover crops. The biggest is the **use of water.** Nearly 300 pounds (36 gal) of water is required to produce one pound of aboveground dry matter. Using this conversion a 5000-pounds/acre cover crop would consume about 6.5 inches of water (180,000 gal). In areas, which receive high rainfall, the cover's use is not usually a detriment to the eventual volume of water stored in the root zone. However, in areas of lower winter rainfall, the cover can use a portion of the moisture normally stored in the root zone for later use by the orchard. Hence, more water must be pumped to meet the orchard's seasonal water requirement. Perennial cover crops, which grow year round, compete successfully with the orchard for water. Studies in a mature almond orchard indicate a 10-30% increase in orchard water use when a perennial clover was present when compared to bare soil.

Lower spring temperatures on cover cropped orchards may increase the **risk of frost**, especially with early varieties. A dense cover crop will reduce the temperature at the surface level in comparison with bare ground. Close mowing of the cover before the frost hazard will reduce the possibility of damage from radiation type frosts.

Cover crop biomass production and orchard sanitation practices used to control navel orangeworm (NOW) can be in conflict. **Orchard sanitation** is the most important element in a NOW control program. It requires the mower to be adjusted low enough to shred the nuts before insect emergence. This practice can decrease biomass production and be detrimental to some species.

Another problem that may result from cover cropping is the buildup of **pocket gophers and voles.** Gophers are particularly attracted to annual and perennial clovers.

Winter annuals that die off in early summer can be allowed to stand and compete (for light) with germinating summer weeds or be mowed. Repeated mowing helps decompose the cover crop residue. Legume residue decomposes very fast where as grasses are slower. Full coverage irrigation systems (flood and sprinkler) speeds decomposition whereas microirrigation (drip and microsprinklers) leave more residues in the non-wetted areas. **This cover crop trash can cause a slower harvest** and in wet years, can increase the incidence of mold if nuts are left on the ground.

### **Choosing a Species**

When choosing a cover crop species or mix of species, growers should first determine the benefits desired and potential drawbacks addressed in this article in conjunction with specific orchard conditions, cultural practices, and lastly, costs. Table 1 contains a number of popular species, growth habits, physiology and common seeding rates.

### **Costs**

There is no doubt the use of cover crops results in increased costs. Annual and perennial cover crops require seedbed preparation, planting, and further attention to controlling potential drawbacks. Annual crops, which are good re-seeders and are not mowed or disked until seed maturity has been reached, may last for 2 – 4 years. Seed costs alone can range from \$15 - \$50/acre with \$35 being typical. Add soil preparation and planting costs and the cost is typically \$45 - \$65/acre. If using a reseeding annual or perennial the one time costs can be average over the time of the crop (average 3 years) to get an annual cost. Don't forget to consider additional rodent control and water in the yearly costs.

### **Getting Started**

Cover crops in walnut are most successful when planted soon after harvest, before leaves fall and when rainfall or irrigation water is available to provide for germination and good seedling growth. Covers can be broadcast into lightly worked orchard middles followed by a springtooth harrow. Broadcasting lightweight non-aerodynamic grass seed can lead to uneven distribution. Coated legume seeds broadcast well. Brillion type seeders work well with legumes and some grasses but can plug easily with some multi species mixes. Seed drills can be adapted for most of species but can also have difficulties with multi species mixes. No-till drills which drill directly into the orchard floor with out any other seedbed preparation are faster and usually cheaper than the methods requiring soil preparation and seed covering practices. Be sure to consult your seed dealer as to their experiences with seed and seeder experiences.

### **Additional Sources of Information:**

*Covercrops for Agriculture*, University of California DANR Publication 21471

*Cover Cropping in Vineyards*, University of California DANR Publication 3338

Table 1. Selected Characteristics of Important Cover Crops For California\*

Common name	Growth Habit	Maximum Height (inches)	Flowering Period	Maturity Period	Tolerates Close Mowing in Winter	Reliably Self-Reseeding	Seeding Rate (lbs/ac)	Comments
<b><u>Legumes</u></b>								
			<b>WINTER ANNUALS</b>					
Bur medic (burclover)	Prostrate to erect	6-15	Feb-Apr	Apr-May	Yes	Yes	15-20	Neutral to alkaline soils; 'Santiago' has no burs
Field pea	Viny	18-30	Mar-May	May-Jun	No	No	70-120	'Magnus' & 'Miranda' are especially vigorous
<b><u>Clovers</u></b>								
Berseem	Erect	18-30	May-Jun	Jun-Jul	Yes	No	15-20	Needs multiple cuttings for best results
Crimson Rose	Erect	12-20	Apr-May	May-Jun	Yes	Yes	20-25	Fast winter growth
	Semi erect	8-15	Mar-Apr	May-Jun	Yes	Usually	15-20	'Hykon' is an early & well-adapted variety
Subterranean	Prostrate to semi erect	6-15	Mar-May	Apr-Jun	Yes	Yes	20-25	Many varieties bury seedhead; most prefer neutral to acid soils; 'Koala' & 'Clare' tolerate alkalinity
<b><u>Vetches</u></b>								
Bell (fava) bean	Erect	36-84	Mar-May	May-Jun	No	No	120-150	Host for bean aphid
Common	Viny	18-24	Apr-May	May-Jun	High	Yes	40-80	Winter hardy; has extrafloral nectaries
Hairy	Viny	18-24	Apr-May	May-Jun	High	Yes	35-50	Very winter hardy; adapted to sandy soils
'Lana' woolypod	Viny	18-24	Mar-May	Apr-Jun	High	Yes	40-60	Produces some hard seed; popular in California
Purple	Viny	18-24	Apr-May	May-Jun	High	Yes	40-60	Least winter hardy vetch; popular in California
<b><u>Nonlegumes - Grasses</u></b>								
Annual ryegrass	Erect	36-60	Apr-May	Jun-Sep	Yes	Yes	20-35	Rapid growth; high biomass; late maturity may lead to competition with trees & vines
Soft chess ('Blando' brome)	Semi erect	12-30	Mar-Apr	Apr-May	Yes	Yes	12-15	Reliable; reseeds well; good for erosion control, grazing
Foxtail fescue ('Zorro')	Erect	12-24	Mar-Apr	Apr	Yes	Yes	8-12	Tolerates poor soils; good for erosion control
<b><u>Cereals</u></b>								
Barley	Erect	24-36	Apr-May	May-Jun	Yes	Yes	80-120	Heat, drought, & salinity tolerant
Cereal rye	Erect	36-72	Apr-May	May-Jun	Yes	Yes	60-120	'Merced' is drought tolerant; many varieties tolerate waterlogged soils
Oat	Erect	24-60	Apr-May	May-Jun	Yes	Yes	100-120	Relatively drought intolerant; tolerates wet soils



Common name	Growth Habit	Maximum Height (inches)	Flowering Period	Maturity Period	Tolerates Close Mowing in Winter	Reliably Self-Reseeding	Seeding Rate (lbs/ac)	Comments
<b><u>Others</u></b>								
Mustards	Erect	24-72	Mar-May	Apr-Jun	No	Yes	10-15	Rapid growth; may host brassica crop pathogens
Tansy phacelia	Semi erect	12-36	Mar-May	May-Jun	No	Yes	10-15	Grows rapidly; residues decompose readily
<b><u>Legumes</u></b>								
<b>PERENNIALS</b>								
Birdsfoot trefoil	Semi erect	12-24	Jun-Sep	Jul-Oct	Yes	No	10-15	Slow establishment
Strawberry clover	Prostrate	8-12	May-Jun	Jun-Jul	Yes	Yes	10-15	Vigorous; invasive; heat & drought tolerant
White clover	Prostrate	8-12	May-Jul	Jul-Aug	Yes	Yes	10-15	Vigorous; invasive; shade tolerant
<b><u>Nonlegumes</u></b>								
Perennial ryegrass	Semi erect to erect	8-36	May-Sep	Jun-Oct	Yes	Yes	25-35	Vigorous; competitive
<b>SUMMER ANNUALS</b>								
<b>Time of First Flowering (Days After Seed)</b>								
<b><u>Legumes</u></b>								
Cowpea (blackeyed pea)	Erect, viny	18-36		40-80			35-40	Performs well with minimal irrigation; may attract lygus bugs
Hemp sesbania	Erect	48-120		60-85			20-25	Drought intolerant; may attract bean aphid
Hyacinth bean (lablab)	Viny	18-36		60-85			40-45	Performs very well with minimal irrigation
Annhemp	Erect	48-120		60-85			20-25	Drought tolerant; rapid growth
<b><u>Nonlegumes</u></b>								
Buckwheat	Erect	12-24		25-30			20-30	Drought intolerant; flowers attract beneficial insects, as well as lygus bugs
Sorghum & sudangrass	Erect	36-120		60-80			25-35	Rapid growth; performs well with minimum irrigation

**NOTES:**

Optimum seeding rates may vary based on local conditions and planting dates. Check with seed supplier for the most appropriate rates.

Listed rates are for monocultures only. Use reduced rates for species mixtures.

\*Some characteristics listed apply to the most common varieties used in California. Characteristics may vary greatly by location.

Source: Ingles, C et. al., Selecting the right cover crop gives multiple benefits California Agriculture Sept-Oct 1994

## **APPENDIX E**

**WALNUT PMA WEB SITE.**



Will Stockwin (530) 756-8518, ext 22  
P.O. Box 363, Davis, CA 95617  
[will@caff.org](mailto:will@caff.org)

## Walnut PMA Web site

<http://www.walnut.org>

Go to Walnut Site Index box in top right corner, click on scroll arrow and select Related Sites and Resources.

<http://www.walnut.org/related.html>

### > Nut Sites

- International Nut Council (INC)
- Northern Nut Growers Web site
- USDA Agricultural Atlas
- NASS Ag Statistics
- Statistics
- DFA of California
- > • Walnut Pest Management Alliance

### Walnut Pest Management Alliance

- > • News and information - 5/31 meeting flyer
- > • Background - Walnut PMA Poster information
- > • Research - PMA Project 2000 final report (contacts)
- Contact information - not live (see Research)
- Related sites - not live

## **APPENDIX F**

**CALIFORNIA WALNUT COMMISSION NEWSLETTERS: WINTER  
REPORT-FEBRUARY, SUMMER REPORT-JUNE, FALL REPORT-  
NOVEMBER, 2001.**



## CALIFORNIA WALNUT COMMISSION **FALL REPORT**

2001-2002

November 2001

### CWC Receives 2001 MAP Allocation

In June 2001, the CWC once again received marketing support funds from the Market Access Program (MAP) through the USDA. These funds are designed to assist commodity organizations with opening and establishing new markets around the world.

For the current 2001/2002 marketing year, the CWC received \$2,247,657. While this allocation is 1.5% below last year's, we actually improved our ranking one spot among the 34 cooperators in our division. The lower funding level is due to a reduction in available funds for the MAP program, due to lower carryover funds from the previous year. In other words, the commodity groups are spending more of what is allocated to them. This lower carryover resulted in a four percent reduction in total

available funds. Because we scored well, we received only a 1.5% reduction.

Our ranking is determined by five factors. One area that is especially important in our evaluation is grower contribution. The support the walnut industry provides to our marketing efforts is one of our greatest strengths. The Market Development Committee approved expenditures for export marketing activities at \$3,265,000 for marketing year 2001/2002. Combined with MAP funds, the Commissions' export marketing activities will total \$5,512,657 in eight countries: Japan, Korean, Germany, Spain, Italy, Israel, Canada, and new for 2001 is the United Kingdom.

### "The Omega Advantage"

The word "omega" has been associated with science fiction novels ("The Omega Man") and we all know it is a letter in the Greek alphabet, just ask a college student who belongs to a fraternity. It is also the name of a constellation of stars. Only recently has the word been linked to California walnuts, but it is a relationship that is most important to us.

The walnut has been the focal point of many published health studies all of which indicate that this unique food is heart healthy. The first published study, the *Loma Linda Study*, appeared in the *New England Journal of Medicine* in March 1993. Others have followed both here at home and abroad. The most recent publication appeared in the *Journal of Clinical Nutrition* this past July (2001) and once again the walnut proved to contribute to good cardiovascular health.

Scientists first thought that the unsaturated fat in walnuts was the reason for the positive results. However, some studies began to show a differential based upon the type of unsaturated fat in the diet. The *Barcelona Walnut Trial*,

published in the *Annals of Internal Medicine* in April 2000 showed that walnuts could further reduce cholesterol by replacing other unsaturated fats (monounsaturated fat, in this case, the olive oil used in the Spanish diet) with the polyunsaturated fatty acids found in walnuts. The most notable of these polyunsaturated fatty acids is *omega 3's* (also known as *N-3*).

The interest in *omega 3* fatty acids is growing rapidly. Blood type diets used to treat everything from heart disease to skin disorders include walnuts as a "positive" food. The *American Heart Association*, the *British Health Foundation*, *Health Canada*, and the *World Health Organization* have all identified the benefits of *omega 3 fatty acids*. Many health authors point to the value of *omega 3's* and of course, **walnuts**. Salmon is another good source of *omega 3's* however; walnuts are a much better choice with corn flakes or yogurt.

So, why not try a handful of California walnuts each and every day. To your health!

## Export Marketing Update

In an effort to keep our readers better informed about the activities we are conducting around the globe, this new page is being introduced in this issue to provide a review of our current activities. We hope you enjoy it.

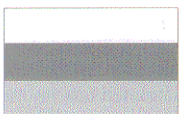


### Canada

In the spring of 2001, Canada jump-started their spring marketing program at the annual Good Food Festival! The 9th annual Good Food Festival and Market was host to 30,000 consumers this year.

Attendance was up from last year and there was a steady stream of people from the time the doors opened until closing. Over 10,000 people tasted samples of California walnuts.

One month before the show, a 24-page pre-show publication was mailed out to approximately 100,000 households. The full-color 8 1/2 x 11 inch recipe booklet contained 50 recipes from show participants and cookbook authors including a recipe/photo for *Chocolate Walnut Brownies* courtesy of the California Walnut Commission.



### Germany

On August 30, 2001, the CWC hosted a trade luncheon at the Haffencub in Hamburg, Germany. There were approximately 20 members of the import and retail trade present at the meeting. The primary purpose of the meeting is to present the marketing programs for the 2001 marketing year. Maria Kraus from our advertising agency, Stefanie Reifenrath of our public relations agency and Ruth Ralfs who represents California walnuts in the bakery and food processing industry gave presentations. The importers seem very supportive of each of our programs, but expressed slight concern about the decline of the inshell market in Germany and asked for greater support from the CWC. To that end we are working with them to support inshell sales through increased advertising support and in-store merchandising. Over all it was a very successful event and further enhanced the dialogue between the CWC and the German import trade.



### Israel

In the spring of 2001, the CWC sponsored our first Cooking with Walnuts contest at the Tadmor Cooking and Hospitality School in Tel Aviv. This state run school is the largest in the country. In September, the winner of this contest, Shlomi Nachum, was flown to California for continuing education



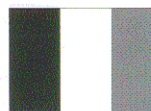
*Shlomi Nachum*

at the Culinary Institute of America (CIA) at Greystone in the Napa Valley. The young chef was thrilled to be our first winner and felt the experience he gained at the CIA would be invaluable as he embarked on his career as a chef. His winning recipe was "California walnut ravioli with black currants and white chocolate filling." Sounds delicious!

Events like this and the resulting media coverage further the awareness of California walnuts among both young chefs and consumers in Israel.



*Finalists from the school in Tel Aviv with Chezi Almog, CWC Representative.*



### Italy

In Italy food is life! Food is an important part of the Italian culture. And dining out is one key element. You won't find many chain restaurants in Italy because the food is too regional, too important to be pre-planned and packaged. To address this diverse but important industry, the CWC continued program with white tablecloth restaurants throughout Italy. By reaching the best, trend setting restaurants, we hope to influence consumer perceptions and opinions and establish



trends for other restaurateurs to follow. To implement this exciting program we have partnered with the Restaurant Association in Italy. This organization is comprised of 50 individually owned and operated restaurants in most of the regions of Italy. The program was successful at showing these restaurateurs new ways of using California walnuts with 12 of them making permanent additions to their menus.

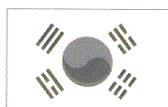


## Japan

In July the CWC hosted our 12th California Walnut Contest. This exciting event received a record 263 entries from bakers, confectioners, and chefs from all over Japan. This year's Grand Prix winner was a new preparation of a traditional Japanese confection called "Shorkkyuu" (Laughing munchkins). There were winners in four categories including breads, pastries, confections and cooking. The winners receive promotional funds to launch their winning products into the Japanese market. This contest has proven to be the springboard for some of the most successful retail walnut products in Japan. It not only challenges the bakers to use walnuts in a new way, but also it raises the bar for walnut-based products introduced to the market.

### Calendar Note

The biennial trade meeting will be held November 6 at the Akasaka Prince Hotel in Tokyo! This event launches the marketing year in Japan and includes nearly 250 guests!



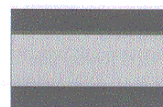
## Korea

Upcoming events for Korea include a Reverse Trade Mission and the annual Trade Meeting. The trade meeting will be held **Friday, November 2** at the Grand Hyatt in Seoul, Korea. It promises to be a good event with key trade members from throughout Korea attending.

From October 21-26, the CWC hosted nine Korean visitors. The trade mission was comprised of two groups, the first being research and development professionals from leading

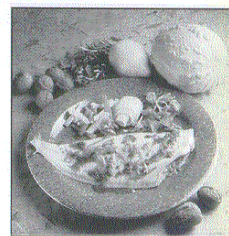
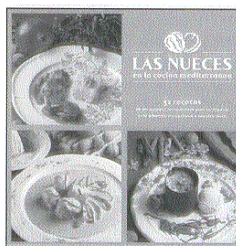
retail confectionary companies, while the second half of the group were members of the Korean media. Our visitors were taken on harvest tours and to local bakery and retail establishments to see how walnuts are harvested, processed and eventually used here in the U.S. A similar event in April, 2000 led to the development of a retail confection in Korea.

The CWC in partnership with the Korean Baker's Association hosted the seventh annual New Product Development Contest in July in Seoul, Korea. The contest winners won a week of continuing education classes at the CIA at Greystone in addition to the promotional funds awarded to the winners' companies. The six-member delegation visited California during the first week in September. Our on-going sponsorship of this contest with the KBA has allowed us to develop a strong relationship with the Korean bakery trade.



## Spain

Under development for the past year, the CWC will produce a cookbook for the Spanish market available later this year. Titled "*Walnuts in the Mediterranean Kitchen*," the book features a recipe from each of the 52 regions of Spain. Additionally, there will be a section focusing on the most traditional uses of walnuts in the Spanish kitchen. The book was created with two partners, GENA, a food and nutritionist group and Hotel and Tourism University School (EUTDH) at the University of Barcelona. The cookbook will be the focal point of many of our public relations activities in the coming year including the book launch, contests and sampling opportunities. Through this book we hope to provide the Spanish consumer new ways to use California walnuts in everyday meals.



## Domestic Activities

This is an exciting time in the domestic marketing program. Our tradeshow participation and response has been absolutely phenomenal this year! We are attending 10 tradeshow focused on several major areas: foodservice, health, bakery and savory. This year we have implemented a participant follow-up program. By obtaining information from those people who visit our booth, we are able to contact them after the show. This enables us to establish relationships with the various health professionals, chefs and processors throughout the country and internationally to ensure that they are receiving the most up-to-date information about California walnuts and their usage.

This November the California Walnut Commission will become a proud sponsor of Copia: The American Center for Food, Wine and the Arts. Copia is located on a 12-acre site situated on the Napa River. The Center is the world's leading cultural center dedicated to the discovery, understanding and celebration of wine, food and the arts.

Adjacent to Julia Childs Restaurant and the lush gardens, guests will find the California Walnut Commission N Grove. This grove will include a variety of tree nuts including four walnut trees. *California Walnut Growers* will also be listed as a major sponsor inside the entrance of the Center.

The domestic program also is busy with a variety of different media activities, including color pages that will appear in newspapers around the country and media tours. At this time we are also facilitating and negotiating a relationship with a renowned chef to work with us in several upcoming media events. As the holidays approach we are looking forward to a bountiful publicity season touting the versatility, taste and health of California walnuts. Below you can find some of the recipes created and distributed to the media for the holiday gift-giving season. Enjoy!

### Maple Walnut Pound Cake



1 cup butter or margarine, softened  
1 1/2 cups granulated sugar  
1/2 cup packed brown sugar  
2 1/4 cups flour  
1 teaspoon baking powder  
1/2 teaspoon salt  
1/4 cup milk  
1 tablespoon maple flavoring  
5 eggs  
1 1/2 cups chopped walnuts  
Maple Glaze (recipe follows)  
Walnut halves or chopped walnuts, for garnish

In mixer bowl cream butter and sugars until fluffy. In another bowl combine flour, baking powder and salt. In measuring cup combine milk and maple flavoring; beat into butter mixture alternatively with flour mixture. Beat in eggs 1 at a time. Mix 1 1/2 cups chopped walnuts. Turn into greased 9 or 10-inch tube pan. Bake in lower third of 300-degree oven 60-75 minutes, just until pick inserted in center comes out clean. Cool in pan 15 minutes, then turn out onto rack to cool completely. Drizzle with maple glaze and garnish with walnuts.

Makes one 9 or 10-inch cake (12 to 14 servings)



**MAPLE GLAZE:** In small bowl mix 1 cup sifted powdered sugar with 1 to 1 1/2 tablespoons milk to make a glaze of thick pouring consistency. Stir in 1/4 teaspoon maple flavoring.

### Southwest Spiced Walnuts



2 cups California walnuts  
1 tablespoon sugar  
1 teaspoon sea salt  
1/2 teaspoon garlic powder  
1/2 teaspoon ground cumin  
1/4 teaspoon cayenne pepper  
1 tablespoon walnut oil

Plunge walnuts into a pot of boiling water, turn off pot and let stand 2 minutes. Drain, spread on baking sheet and roast in 375° oven for 10 minutes. Measure seasonings in a small bowl and stir to combine. Heat oil in a skillet. Add toasted nuts and toss 1 minute. Add seasoning and toss until nuts are coated. Cool on a paper towel. (Makes 2 cups.)

### Indian Spiced Walnuts

2 egg whites, lightly beaten  
1 1/2 teaspoons curry powder  
1 tablespoon ground cumin  
1 1/2 teaspoons salt  
1/2 teaspoon sugar  
4 cups California walnuts, halves and pieces

Coat large, shallow, baking pan with non-stick vegetable spray. Mix egg whites with spices. Stir in walnuts and coat thoroughly. Spread in prepared pan. Bake in 350° oven 15-18 minutes, until dry and crisp. Cool completely before serving. (Makes 4 cups.)



## CAROL BERG SLOAN JOINS CWC



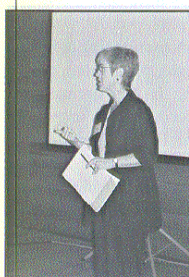
We are pleased to announce that Carol Berg Sloan, R.D. has joined us in a consulting position as a Registered Dietitian. In this new position, Carol will be managing research projects, represent the WMB/CWC at specific trade shows and keep the WMB/CWC apprised of appropriate breaking news and research in the world of food and nutrition. Carol has been working in the field of food, nutrition and dietetics since 1980 and has been involved in health care sales, nutrition therapy and preventive/wellness concepts of nutrition for pediatric, geriatric, and maternal nutrition.

Currently she works as an independent consultant specializing in nutrition communications and food safety issues for several organizations. Carol is the Nutrition Editor for United Parenting Publications and writes food and nutrition articles for several web sites and professional publications. She is involved with the American and California Dietetic Associations as well as Roundtable for Women in Foodservice and the International Association of Culinary Professionals. Carol lives in Long Beach with her husband and three children.

Carol looks forward to becoming a part of the WMB/CWC team and spreading the good word about walnuts as part of a healthy lifestyle!

## CWC Sponsors Omega-3 Workshop in Vienna

On August 28, the California Walnut Commission sponsored a workshop titled "Walnuts and Cardiovascular Health" at the 17th International Congress of Nutrition. The theme of this congress was "Modern Aspects of Nutrition – Present Knowledge and Future Perspectives." Over 3,000 nutritionists and scientists from all over the world attended.



Dr. Schneeman moderates an animated discussion.

The Walnut Workshop was a big success, focusing on the role of walnuts and omega-3 fatty acids in improving cardiovascular health. Our keynote speaker was Dr. Artemis Simopoulos, Director Chairwoman of The Center for Genetics, Nutrition and Health and the author of "The Omega Diet". Her riveting presentation was followed by a wonderful overview of the epidemiological research on walnuts from Dr. Joan Sabate of Loma Linda University and the author of our first clinical research published in the *New England Journal of Medicine* in 1993. Dr. Emilo Ros from the University of Barcelona provided a wonderful overview of the Barcelona Study published last year. Dr. Simopoulos was most interested in the direct relationship of walnuts on blood cholesterol in the Mediterranean diet.

The final presentation was from Dr. J.F. Diehl, a retired Professor of Nutrition Sciences in Germany. He made a call to the audience for further research on the relationship of walnuts to cardiovascular health, especially in northern Europe, where little research has been done. The panelists were then led in a discussion by moderator Dr. Barbara O. Schneeman, Professor of Nutrition at U.C. Davis. Dr. Schneeman did an excellent job of moderating the discussion and fielded questions from an audience of over 120 people.



Our panelists: Drs. Diehl, Ros, Simopoulos, and Sabate.



## USDA Announces Walnut Purchase

In late August the USDA announced its most recent walnut purchase. Their "invitation" was sent to California walnut handlers on August 30, 2001 asking for bids on walnuts in three separate forms; 30 pound boxes of pieces, 24/1 pound cello packages of pieces and walnuts as a key component of a trail mix which also contains several types of dried fruit.

The trail mix was introduced into the schools as a part of an afternoon snack program and was well received by the students and administrators alike. This year's purchase of California walnuts for use in the trail mix will total more than 600,000 pounds. It is good business and it establishes walnuts as a part of a snack in the schools.

The remaining buy is just over 4,100,000 pounds with deliveries scheduled from December 1, 2001 through June 30, 2002. A portion of this product will be used in the schools in traditional uses such as cookies and brownies. However, in recent years the use of walnuts has been expanded into salads and granola bars.

The Walnut Marketing Board now sponsors an annual competition for school chefs to encourage the development of new uses for California walnuts. This is but one of several activities designed to keep California walnuts in front of the menu planners, chefs and other school food service personnel. In July, we exhibited at the annual American School Food Service Association (ASFS) National Conference in Nashville, Tennessee. It was the walnut industry's sixth year in attendance. We had the opportunity to visit with roughly 1,500 school food service professionals, including officials of the USDA, over the three days of this event, the largest of the year for the ASFS. We'll be in Minneapolis in July 2002 for their 55th Annual Conference.

During the year a series of press releases including recipes and photographs are distributed to various school food service publications such as School Food Service and Nutrition magazine. Many of these recipes are developed in pilot programs run with select school districts. Our competition also yields a number of fine formulations which we are able to publish. This has two benefits; the recipe has been developed by a member of their peer group and; the broad public recognition of these recipes encourages more participation in subsequent recipe contests.

Is it a good strategy to develop the school food service business? You bet it is! In the 2001/02 crop-year, this segment (including the food banks that are also a part of

the program) of our business will consume over 4,700,000 pounds of shelled California walnuts. That's nearly 5,000 inshell tons of walnuts. If we look at this volume in terms of our export markets, only Japan, Germany, Canada, and Israel are larger.

In addition, it is a cost effective means of introducing new ways to use walnuts to our consumers of the future, the children of today.

### IN MEMORY OF HAROLD I. FORDE

*Harold Forde died on Saturday, October 13 at the age of 87. He was a founder of the California walnut industry as we know it today, having developed Chandler, Howard, Sunland, and Tulare, and much of the knowledge we have about breeding walnuts.*

*Harold was employed by the University of California, Davis Department of Pomology for over 30 years as a Staff Research Associate. He initiated the walnut-breeding program in 1948 with Gene Serr. After Serr's retirement in 1965, he continued the program until his own retirement in 1978. At that time, he released three new cultivars from crosses made in 1963 and 1965: Chandler (64-172), Howard (64-182), and Sunland (66-4). Chandler is the most popular cultivar in California, making up over a quarter of the bearing acreage and most of the recent nursery sales.*

*He received a distinguished service award in 1994 from the California Walnut Commission and the Walnut Marketing Board for his pioneering of the successful breeding program for walnuts at UC Davis, and his many years of outstanding service to the walnut industry. It has been said that he may be the last person who could look at a walnut and name the variety and he knew the story behind just about every variety in the field today. He was always happy to share his knowledge and expertise with others. We have lost an extraordinary contributor to the development of our industry.*



## Walnut Pest Management Alliance Project Nearing Completion of Another Productive Year

The Walnut Pest Management Alliance (WPMA) Project is nearing the end of its third year. We will have results of the treatments after harvest damage has been collected and all of the data is evaluated. The third year of the project has been productive in both outreach and research. Two well-attended field meetings were conducted. In Sutter/Yuba County the meeting in May focused on cover crops. A summary of the information presented at that meeting can be found in the article by Will Stockwin. Additional information about cover cropping is available in "Cover Cropping in Walnut Orchards" written by Terry Prichard, Water Management Specialist UC Davis and Janine Hasey, Farm Advisor, UC Cooperative Extension Sutter/Yuba County. A copy that includes a table with a list of over 30 popular species with information about their growth habits, physiology and common seeding rates can be obtained by contacting your local Cooperative Extension Farm Advisor's office.

Research has continued on developing alternative strategies for codling moth control in walnuts, and this was the focus of another field meeting in September in Farmington (San Joaquin County). Highlights of that meeting can be found in a second article by Will Stockwin. The article discusses mating disruption and some of the new sprayable products that are in the early phases of field trial testing. These sprayable products will be widely tested in the upcoming fourth year of the WPMA Project.

The kairomone lure is another new technology being evaluated within the WPMA treatment blocks. Be sure and read Doug Light's article for an excellent update on this technology and its usefulness in mating disrupted orchards.

*To request a copy of "Cover Cropping in Walnut Orchards" contact your local Cooperative Extension Farm Advisor's office. The article is also available by visiting the Walnut Marketing Board Web site at [www.walnuts.org](http://www.walnuts.org).*

## Alternative Strategies for Codling Moth Control in Walnuts

Will Stockwin,  
CAFF Publications and Outreach Manager

Approximately 30 growers assembled at Chiappe Farms near Farmington on September 10 for what University of California farm advisor Joe Grant called "a snapshot of where mating disruption methods for codling moth in walnuts is right now."

The meeting was a collaboration of the Walnut Pest Management Alliance (WPMA) and the San Joaquin Walnut BIOS Project, two complimentary efforts pursuing alternative pest control methods for reducing pesticide use in walnut production. WPMA is a partnership between industry and the Department of Pesticide (DPR) Regulation; the BIOS project brings back the proven team of UC and Community Alliance with Family Farmers (CAFF).

That pheromone mating disruption works is now conceded by even the highly skeptical Grant, who said he sees the technique "as at least partially replacing hard insecticides" after post-second flight (Aug. 2) canopy counts in test blocks indicated less than a half percent damage in all treatments. The control shows seven percent. Bob Elliott from DPR agreed. "We're finding that these soft programs are a good fit for walnut growers," he said. Growers say the costs are too high. The Isomate C+ six twist-tie/tree treatment, for instance, runs \$173/acre. Grant knows what growers think of that. "Twist ties — as they are right now — just aren't commercially viable," he said. "That's why we're so excited about the potential of sprayable pheromone. Growers all have spray machines and applying it that way is cheaper and easier."

UC Berkeley researcher Steve Welter has been testing a 3M sprayable product that protects for about 30 days. "In orchards with lower codling moth pressures, I've seen trials where it works as well as the grower standard," he said. "In a high pressure orchard, however, any pheromone program will be a spectacular failure if it's not sprayed out first."

Welter said he's also looking at combining codling moth and navel orange worm pheromone applications. "It would be ideal if we could tank mix them and take care of both

pests. We just started and I don't know how far away that might be."

Effective, low-cost puffer applications may be closer. "I think we've underestimated the puffers," Welter said. He's been experimenting with puffers in abandoned pear orchards.



San Joaquin County Farm Advisor Joe Grant displays a puffer for dispensing codling moth pheromone.



"If there's high codling moth pressure they run through the pheromone like it's not there," he said. In more recently abandoned orchards, he said that inside the plume area, "the damage gets down to two percent. If that data is true, we might be able to use fewer machines without hurting coverage."

More testing is needed, however. That can also be said of Russ Stocker's wing-mounted twist-tie dispenser. Stocker's company, Arena Pest Management, has pioneered aerial applications of *Trichogramma* wasps using parasitized grain moth eggs as carriers.

The twist-tie dispenser started as an automatic flag dispenser cropdusters sometimes use to mark a field location. Stocker loads it with pairs of cardboard paddles at opposite ends of about six feet of cord. Two twist-tie applicators are stapled to each paddle.

"We did five acres this year just to see if it was going to be practical," he said. "It looks like it could solve the problem of getting the twist-ties higher in the tree. About 20 percent of them land on the ground, but the ones we dropped into trees last year are still up there 11 months later."

## *Kairomone Lure, New Tactics Against Codling Moth*

*Doug Light, Research Entomologist USDA/ARS/Western Regional Research Center, Albany*

A new era of codling moth (CM) IPM is dawning with the implementation next year of a novel attractant for monitoring female moth emergence, flight activity, and mating — egg laying status. Four years ago our team of entomologists and natural product chemists at the USDA Agricultural Research Service (ARS) (located in Albany, CA) discovered a novel, pear-derived host plant odor. This odor, or "kairomone," is highly attractive to both male and virgin and mated female codling moths, while unattractive to other pests and natural enemies. In addition, this kairomone is as potent as pheromone, capturing in traps a similar number of moths for up to two months between replacement of the lures. Both the monitoring and the control potential of the new kairomone are being developed and patented through a cooperative research and development agreement or partnership between ARS and Trece, Inc. (Salinas, CA), the world's leader in insect monitoring technology.

One might ask what is the need and benefit of using this new kairomonal lure for CM population monitoring? Simply, the goal for monitoring adults has always been to predict when and to what level (risk) egg laying will occur. Use of pheromone-baited traps is an indirect approach of monitoring only male flight activity. The use of this kairomone will allow for direct monitoring of female flight activities, including biofix — emergence, flight intensity and pattern, and assessment of the degree and frequency of female mating. Pheromone-based monitoring systems, present a great potential for error in estimating egg hatch based on male capture in pheromone traps and related interpretation of degree-day accumulation models. Female monitoring is a direct measurement of female presence and their relative numbers and provides a more reliable predictor of when mating and egg laying has reached its peak. As environmental regulations require use of less toxic and shorter-lived pesticides (e.g., IGR ovicides or egg poisons), accordingly, it becomes critically important to know exactly when females mate and begin their egg laying, so that decision-making and treatment timing can be optimized.

The Walnut PMA has been helping to develop the new kairomone lure in comparison to pheromone lures for CM monitoring in their demonstration orchards. Figure 1 illustrates

the relative capture efficiency and monitoring capability of traps baited with the kairomone vs. pheromone in both WPMA conventional ("grower standard") and mating disruption pheromone-treated (Isomate C+) orchard blocks. In the conventionally managed orchard, both the kairomone and the pheromone lures detect the initial emergence (biofix) and the pattern, duration, and peak of all three codling moth flights (Figure A). However, use of the kairomone-baited traps clearly shows that the female flight activity is primarily in the later half of the 1A flight (the initial emergence of over-wintering adults) and throughout the 1B and 2<sup>nd</sup> flights (Figure B). A relatively low degree of female emergence was observed in the 3<sup>rd</sup> flight period. So at the onset of the 1A flight and during the 3<sup>rd</sup> flight, pheromone-baited traps were capturing relatively high numbers of males (Figure A), while female moths were much less present, as depicted by the kairomone trap capture (Figure B). Therefore, pheromone-based monitoring could potentially cause a "false positive" decision to treat, when in this example the threat of female egg laying should not have been a concern.

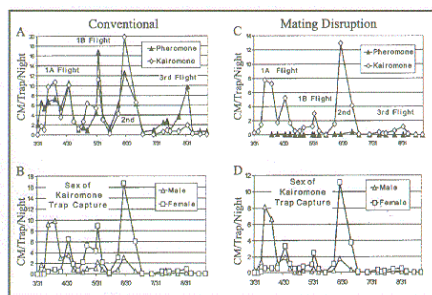
The remarkable benefit of population monitoring with the kairomone is obvious in an orchard under pheromone mating disruption (MD) treatment (Figure C). In MD orchards the capture of male CM in pheromone monitoring traps is suppressed (Figure C), thus virtually no information is available about the resident population of moths or invading fertile females. Population monitoring with the kairomonal lure provides a means to accurately detect and track the emergence and flight pattern, and assess the level and potential damage/risk of the resident and immigrant female CM in MD orchards (Figure D). These attributes of the kairomone monitoring system should encourage and promote the use and acceptance of MD practices. It will provide the critical information, assessment, and assurance that: 1) MD systems are working, and 2) precisely when additional augmentative insecticides or other treatments are warranted.

After four years of field trials, the CM kairomonal lure and trap for population monitoring will be commercially available next spring (2002) through Trece Inc. (Pherocon trademark) and its distributors/retailers. Contact Trece for additional information at (831) 758-0204. Trece will begin in the late Fall

2001 to offer training to IPM practitioners, PCAs, and growers in the use of the new kairomone lure.

The future is promising for advances in CM IPM as the partnership of ARS and Trece explore and develop the use of kairomonal attractant in direct control applications targeting both CM adults and larvae. The control tactics being explored include adult mass-trapping and kairomone-enhanced MD, and attracticide ("attract and kill") sprays and bait crop/stations using ultra-low volumes of insecticides targeting both adults and larvae.

We acknowledge support for development of both the monitoring and control systems through grants from the Walnut Marketing Board and the USDA's Area Wide-II IFARS and RAMP orchard IPM programs.



**Figure Legend:**  
Comparison of the emergence and flight pattern activity of codling moths portrayed by the capture of both sexes in kairomone-baited traps (open diamonds) vs. male capture in pheromone-baited traps (solid triangles) for both conventional (A) and mating disruption (C) PMA demonstration orchard plots (San Joaquin Co., 2000). Seasonal flight activity of male (open triangles) and female (open squares) codling moths as resolved by trap monitoring with the kairomone lure in conventional (B) and mating disruption (D) plots.

## Walnut PMA Cover Crop Field Day

Will Stockwin,  
CAFF Publications and Outreach Manager

Mike Bennett knows that in farming "you never get it exactly right" so he's prepared to be patient with learning alternative farming practices, as long as they work and are cost effective.

"We and die by my bottom line," he told a group of approximately 30 people attending a May Walnut PMA field meeting in one of the orchards he manages for Deseret Farms near Marysville. "Some of the things we're doing right now — like cover crops — need

some more adjustment, but as long as we're getting decent prices for our crop we'll keep working at it."

The PMA site is in an orchard of Vina walnuts sited between the levee and the Feather River, where Deseret Farms is looking for a cover crop system to control soil erosion when winter rains push the river into the orchard. "We get beat up pretty bad in here some years," Bennett said. The mixture of subclovers, medics, blanco brome and vetch hasn't been tested by the river since being planted in 1998.



Sutter/Yuba County Farm Advisor Janine Hasey and local growers evaluate the cover crop at Deseret Farms

Bennett said when he mowed before harvest the result was an unanticipated amount of biomass that "slowed the harvest speed in the block by roughly 50 percent," he said. "That's not something we can live with every year."

He warned growers in the group that a vigorously growing vetch cover crop could also invade the tree rows and severely hamper pushing pruning trash out of the orchard in the spring.

University of California irrigation specialist Terry Prichard suggested multiple mowing as one possible solution to both problems. "You might want to think about mowing before you prune," he said. "Excessive biomass isn't so much of a problem with solid set sprinklers because it degrades faster, but that's not the case in an orchard using micros like this one does."

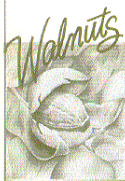
U.C. Sutter/Yuba farm advisor Janine Hasey said early mowing would also reduce navel orangeworm pressure by destroying dropped mummy nuts. "Just do it before mid March so you don't interfere with the cover crop's flowering and reseeding later."

Frost protection is another reason a grower might mow in early spring, she said. "Bare, firm, moist ground is the warmest soil, but a low cover crop is next best," she said. "And we're seeing that it works very well to suppress winter weeds."

Prichard reminded the group that depending on the mix, a cover crop could increase irrigation requirements. "That might mean having to irrigate later in the season to make up for water lost to cover crop development."

A preliminary crunch of the numbers on Bennett's trial, which had to be replanted after an unintentional herbicide application, shows that the cover crop costs are roughly \$10 per acre higher than conventional bare ground. Bennett said that wasn't too much for erosion control.

Anyone thinking about planting a cover crop for the first time shouldn't go to all the trouble and expense of drilling the seed in like he did, Bennett said. "Afterwards I found out you can do just as well broadcasting the seed and then disking and rolling it. Now I tell people who ask about getting started to save some money and use whatever equipment they've got on the farm."



**California Walnut Commission**  
1540 River Park Drive, Suite 203  
Sacramento, CA 95815-4609

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#### WMB/CWC ANNUAL WINTER MEETING FEBRUARY 7-8, 2002 QUAIL LODGE RESORT, CARMEL

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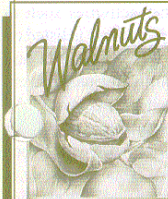
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Dr. Jerry Siebert .....	Ann Coulston

#### ADMINISTRATIVE REMINDER

A grower who markets less than 2,000 pounds of walnuts annually is exempt from paying the California Walnut Commission assessment. If you are eligible for this exemption, please contact the CWC at (916) 646-3807 for reimbursement.





## CALIFORNIA WALNUT COMMISSION WINTER REPORT

2000/2001

February 2001

### NEW CREATIVE CONCEPTS DEBUT AROUND THE WORLD

The Barcelona Walnut Trial, published in April 2000, has had a tremendous impact worldwide. The consumer and trade response to the positive health message has been excellent. We want to build on the strength of this message in all of our marketing programs. In the current marketing year we have created new advertising campaigns in Spain, Germany and Japan that reinforce this health message to both consumers and members of the trade.

In Spain, where the study took place, we have a new television campaign. In this market, television has been used for several



years as it is the most effective way to reach our target audience. This year our advertising message focuses on one of the key concepts of the study: "A handful of walnuts a day will lower your cholesterol".

The campaign uses two ten-second advertisements. These short ads allow us to reach more of our target audience more frequently while staying within the current budget. In the first ad, we see a closed fist. The hand opens to reveal a handful of walnuts. As this happens, the announcer says, "Reducing cholesterol... is in your hands." Then there is a cut to the California Walnut Quality Seal, and the announcer says "California Walnuts. A handful a day."



The second ad is a scene of a business lunch in a restaurant. The smart young man at the table pulls out a handful of walnuts to sprinkle on his salad. There is a slight look of suspicion from the

other diners and then a knowing glance. The voice over is the same and the ad finishes with the same final shot of our quality rosette. Although it is difficult to imagine a television advertisement, the spots are very clever and the simple execution allows for a clear health message.



The Barcelona Walnut Trial also had a significant impact in the German market. This year our campaign has three key message points: California origin, health and versatility.

Appearing in both women's publications and billboards, three new print ads were developed. The first ad ran during the Christmas season to support the traditional inshell market. It showed a vignette of a Hollywood premier and a traditional Christmas lamb dish using walnuts. The headline read "'Take One', for the Walnut".



The second ad will run in the winter months. It shows a delicious fish entree with a vignette of the Golden Gate Bridge. The headline reads "More Walnuts with Fish". In Germany, it is common to use a play on words and in this case the same headline could read "Sea Walnuts with Fish". Interestingly, the word for "more" and "sea" in German are the same.

The final ad headline reads "California Tastes So Crunchy". Again, this is a play on words as the German word for crunchy can also mean "crisp" and also "tone". The ad shows a light, crisp salad with walnuts and a vignette of a healthy young woman rollerblading.



In each print ad the body copy focuses on the "good" fat message and staying fit and healthy with California walnuts. The magazine ads also contain a coupon for our German recipe brochure. These coupons are coded so that we can track which magazine had the greatest response rate.

In Japan, we are also focusing on the health benefits of walnuts and continuing to build on the ancient tradition of eating walnuts for better health. Our Japanese agency, MK Netmark, has produced similar ads for both the trade and consumers to convey a consistent image for California walnuts. The three ads use historical figures such as Cleopatra, Leonardo da Vinci and Atlas to convey the message of how California walnuts can help maintain your beauty, your brains and your brawn because they are so nutritious.

Our other programs in Israel, Italy, Korea, and Canada also use the results of the Barcelona study and the "handful-a-day" concept in their in-store promotions, tie-in programs and public relations. This powerful message will have a long life around the world.



## COMMISSION CONDUCTS DOMESTIC ADVERTISING TEST

It has been many years since the industry began to discuss whether or not advertising for California walnuts in the domestic market would be cost effective. You are probably aware of the successes the industry has had through the efforts of its handlers and the efforts of the California Walnut Commission in developing overseas markets such as Japan. However, domestic activity has been limited to public relations and promotions. In the past, there was good reason to argue that these two vehicles were the best available means for communicating with the consumer cost effectively. However, the emergence of walnuts as a heart-healthy naturally occurring whole food may provide the impetus for change.

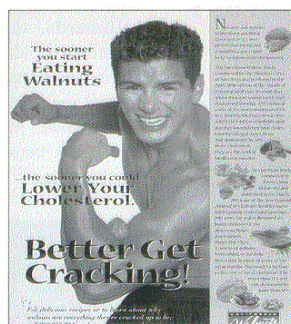
It all began, as you have heard before, on March 4, 1993 when the Loma Linda study was published by the *New England Journal of Medicine*. Subsequently, other research was conducted. On April 4, 2000, the Barcelona Walnut Trial was published in the *Annals of Internal Medicine*. The publicity that the Barcelona Walnut Trial received in the press led to a heightened interest in walnuts. In fact, market research conducted during the summer months indicated that consumers were buying more walnuts in the summer of 2000 as a result of these activities.

Of course, handlers play the most important role in the process since they bring the product to the retailers who in turn display it so the consumers may purchase this delicious nut.

A review of the literature indicates that there are at least eight published studies on walnuts around the world, and during the next 12 to 18 months there will no doubt be one or two more. We are anticipating that further studies will be published and/or presented to scientific bodies over that period of time.

So, what does this have to do with domestic advertising? Well, now we have something very important to say to the consumer. That is, "The sooner you start eating walnuts...the sooner you could lower your cholesterol. Better get cracking!"

The Commission chose to use a laboratory test market methodology to assess the impact on sales at various levels of advertising (using the ad pictured below). Subsequently, that sales data will be fed into



an econometric model. Dr. Harry Kaiser of Cornell University, who has done an econometric study of the existing Board advertising program, will convert these sales figures into a return on investment (ROI). These calculations will allow us to determine the economic feasibility of a domestic advertising program.

It is only since the development of the scientific database that running an ad like this can even be considered. Now, we anxiously await the result.

## CWC - WIRED TO THE WORLD

As part of the California Walnut Commission's activities around the world, a few of our programs include web sites directed at either the consumer or the industrial user. Most of you are aware of our web site here in the U.S.: [www.walnuts.org](http://www.walnuts.org), but many of our export programs also have web sites specifically designed for that country's needs.

In Germany, the web site, [www.walnuss.de](http://www.walnuss.de) is primarily a consumer site, which gets approximately one million hits per year. Our public relations company maintains the site and updates it four times a year. We often

tie the web site to other activities such as radio promotions and the address is listed on all of our consumer advertisements and promotional pieces. During the past Advent season, the site contained an advent calendar revealing a portion of a detective story each day and random opportunities to win "Crack the Nut" prize packages. This was a way to keep consumers interested and motivated to return to the site each day.

In Japan, our site is more focused on technical assistance for wholesalers and industrial users. At [www.ca-kurumi.co.jp](http://www.ca-kurumi.co.jp), there is information about product, storage, marketing activities and recipes among other things. This site is referenced on all of our trade advertising and promotional materials.

We are currently developing a web site in Korea targeted to industrial users, which will provide technical information, recipe ideas and storage requirements. It is much more efficient for bakers and product development managers to pull this type of information off the web than to contact our reps and proceed by "snail mail".

Another site currently under development is for Canada. Over 75% of Canada's population is connected, the highest capita use in the world. Web site development adds another dimension to the integrated communications program. The site will be developed as a bilingual Canadian section on the current California walnut web site. This is a more cost-effective alternative to creating original site information and resources. The materials developed for in-store and media purposes will be included in the Canadian section. The web site will also be used in conjunction with a "consumer information line" for those who are not net-friendly.

The overseas sites can be accessed from your computer at the addresses above. We invite you to take a look. We will keep you posted on the launch of the sites under development.

**Web Site Address:**  
[www.walnuts.org](http://www.walnuts.org)

**E-Mail Address:**  
[wmbcwc@walnuts.org](mailto:wmbcwc@walnuts.org)



## CALIFORNIA WALNUTS IN THE HEADLINES

Following the announcement of the Barcelona study on April 4, 2000, there was immediate coverage by major television, newspaper, radio stations and web sites around the world. But, what happens after this initial publicity blitz?

During the three months after the publication of the study, our public relations firm, Torme & Company, shifted the focus. They targeted secondary media, in particular, media that requires longer lead times such as magazines. This follow-up phase leveraged the Barcelona study with the health value of essential fatty acids, specifically the omega-3 message. The result: our omega-3 health message has been seen in major publications such as *Time*, *The National Enquirer*, *Self*, *Runner's World* and *Health*.

Here are some excerpts:

### **"Think salmon-and walnuts, too**

You'll get the largest omega-3 dose from eating fish a few times a week.

Id-water varieties such as tuna, salmon, bluefish, mackerel, sardines, and herring are best....Other good sources include walnuts, leafy greens, flaxseeds, and flaxseed oil."  
*Health*, September 2000

**"WALNUTS:** Abundant in the Mediterranean diet, walnuts are a rich source of alpha-linolenic acid, a fat that converts to heart-healthy omega-3 acids in the body. Add walnuts to salads, baked goods, appetizers and sauces."

*The National Enquirer*, October 3, 2000

"Since our bodies cannot manufacture their own supply of omega-3s, we have to get them from the food we eat, mostly from fish but also from such plant sources as flax, soybeans and walnuts."

*Time*, October 30, 2000

her area that has been very successful for our industry is third party endorsements. These influential experts independently carry our message to national audiences.

For example, the superstar media guru and author Dr. Andrew Weil promoted walnuts as a source of omega-3s during appearances he made on "Oprah" and CNN's "Larry King Live".

During his interview with Oprah on April 25, 2000, Dr. Andrew Weil said:

*"By increasing intake of these (omega 3's) whether from fish like salmon or walnuts or flaxseed you actually increase brain power."* He concludes by saying that eating a handful of nuts, especially walnuts, can be part of a healthy diet.

The next phase of the public relations program will consist of food editor mailings, direct mail and partnerships with health organizations such as the American Dietetic Association (ADA). A new nutrition brochure entitled "A Powerful Little Package of Nutrition" has been developed. It is a comprehensive, up-to-date guide that summarizes the science behind our health story. The nutrition brochure will serve as a centerpiece for our direct mail program to the medical community as well as with consumers.



In addition, the public relations program will include efforts to continually provide information to authors about the health benefits of walnuts. There will also be a medical publisher program involving a test partnership with one or two large HMOs with the objective to get educational information into doctors' offices and ultimately into the hands of patients.

The objective is to continue delivering our health message to the media. So, keep looking for walnuts in the headlines!

## SIBBETT RETIRES



After more than 35 years as a U.C. Cooperative Extension Farm Advisor in Tulare County, Steve Sibbett has retired to concentrate on other activities including fishing.

"I've truly enjoyed the growers I've worked with, especially those that have cooperated in our local research projects that have produced the advancements improving nut crop production and quality (and hopefully profit too) statewide," Sibbett said.

"Steve Sibbett has been a valuable asset to our industry and his accomplishments are many," said Dennis Balint, WMB Executive Director. In attempting to characterize Steve's program, Research Director David Ramos remarked, "Steve has maintained a vigorous and comprehensive research and education program for Tulare County growers, but in my view, it is his industry-wide impact on growers' innovation and application that makes his efforts extraordinary."

Steve Sibbett provided the leadership for the cooperative research studies with George Martin and others during the 1970s on the influence of harvest timing on walnut kernel quality and the use of ethephon for early harvest, which has led to significant improvement in current practices. He initiated the first research studies on mechanical hedging demonstrating the importance of commencing hedging before orchard crowding occurs.

Steve's teaching accomplishments are equally impressive. He started the annual "Tri-County Walnut Day" in Visalia 32 years ago which has evolved into the largest walnut growers meeting in the state. He was instrumental in the development of six walnut short courses conducted at UC Davis from 1976 to 1995 and the walnut production manual now widely circulated.

Steve's service to the walnut industry includes being a representative on the CWC fact-finding teams to China in 1989 and again in 1999. We all are appreciative of Steve's exceptional contributions to the walnut industry and wish him continued success and enjoyment in his new endeavors.



## CURRENT AND FUTURE DIRECTIONS FOR MANAGEMENT OF CODLING MOTH IN WALNUTS

Stephen Welter,  
Division of Insect Biology, U.C. Berkeley, CA



Several phenomena have resulted in an increased research emphasis on management of codling moth including a) the documentation of resistance in codling moth to some commonly used insecticides b) the development of newer technologies such as pheromone mating disruption for control c) a progressively increasing need to help cut production costs, and d) development of new, more selective insecticides that help provide control without disruption of naturally occurring biological control. While this article expresses my personal views, it actually details the efforts and interests of a much larger group including UC Cooperative Extension, UC/IPM, and other UC faculty. As such, I have tried to outline our current research efforts as well as a sense of our future directions such that growers might better understand how the University of California in collaboration with the Walnut Marketing Board is attempting to resolve some very serious issues in walnut pest management. Many of the following programs are predicated on these assumptions: management of codling moth will need to be developed in the context of the larger IPM program including navel orangeworm, walnut husk fly or mites; future IPM programs will need to address public and government concerns; and any new IPM program must place walnut growers in a stronger economic position.

There are two main thrusts currently in walnut IPM development: 1) the Pest Management Alliance (PMA) that consists of growers, UC Cooperative Extension, UC/IPM Specialists, and the Walnut Marketing Board and 2) more individualized research programs funded by a variety of sources. The most recent additions to the funding pool are funds from two federal programs that will contribute approximately \$4 million dollars to fund research on building more selective programs for codling moth in both pome fruit and walnuts. These funds were awarded in part because of the existence of on-going research and commitments from the various commodity groups in the western US.

The PMA projects and campus based research efforts have now started to be interwoven in more complete and structured ways. The PMA programs have the task of attempting to implement our best management programs and to test and demonstrate research programs that are near-term. As such, the PMA program in 2000 met all objectives including demonstrating that control of codling moth with pheromone mating disruption was feasible, documenting that combination programs of pheromone and a single insecticide application proved superior on average to conventional programs,

understanding the relative value of additional supplemental programs of *Trichogramma* releases, and finally that a new codling moth lure from a plant volatile could monitor codling moth flights accurately in pheromone permeated orchards. Simultaneously, research at UC Berkeley was investigating other pheromone dispensing technologies as alternative hand-applied dispensers that would be logistically more feasible, decrease overall cost of the program, and increase program flexibility. As an example of the integration between research groups, results from the research in 2000 on new technologies are being integrated into the PMA for 2001 as one of the treatment programs.

Research in 2001 will have many of the same emphases, but will build on the datasets collected in 2000. Specifically, two newer delivery technologies look very promising in terms of their ease of use and potential cost savings. These newer technologies include: a) Sprayable formulations of microencapsulated codling moth pheromone by two different companies, 3M and Consep, b) Aerosol emitters ("puffers") that are being produced or developed by several groups, "Paramount Puffers", Consep puffers, or Michigan State Microsprayers.

The first step in the development process for the sprayable formulations was to determine their longevity and abilities to suppress pheromone traps for codling moth. Based on residual analyses and trap suppression of constantly released sterilized codling moths, the sprayable formulations in walnuts appeared to last at least 80 days and provided trap suppression at levels equal to or superior to the standard Isomate C+ treatment. Equally positive, high levels of trap suppression at almost all rates examined suggested that application rates could be reduced dramatically, thus potentially reducing costs. Mapping of pheromone plumes from aerosol emitters suggest that the area of influence of a single puffer may reach in excess of 1500 ft downwind and laterally 200-300 feet in either direction. An additional finding was that the plumes have a residual nature that appears to last for 24-72 hours after the puffers are turned off. This finding would suggest that the plumes do not have to constantly bathe a moth directly, but instead have only to have resided in the area within the past 24 hours.

Research for 2001 will now need to focus on suppression of nut damage rather than trap suppression. Previous research has clearly provided examples where traps are suppressed, but damage is not. The most conservative treatment with the sprayable formulation will be incorporated into the PMA projects, while more aggressive treatments will be tested in experimental plots in terms of longevity, application rates or puffer distributions.

A second major direction has to be building a program that embraces the entire complex of pests including navel orangeworm. Obviously, some species of pests should be less problematic as more effective biological control agents already exist, e.g. the walnut aphid or spider mites. However, inclusion of softer insecticides to suppress moderate to high



populations of codling moth will need to consider our needs for other species that most likely will not be suppressed by biocontrol agents, e.g. walnut husk fly. So, the current emphasis cannot be on developing an insecticide free management program, but rather on management strategies that maximize our use of existing natural enemies, integrate non-insecticidal but cost-effective alternatives such as pheromone mating disruption, and include the minimal use of highly selectively insecticides as supplemental suppression tools.

Alternatively, the long-term goal has to be construction of a self-sustaining system that relies heavily on biological intensive management wherever possible. Therefore, it is essential to develop economically and logistically reasonable alternatives that are viewed as safe for the public and the environment, before current strategies are removed by either biological or legislative changes.

## WALNUT PEST MANAGEMENT ALLIANCE CONCLUDES YEAR TWO WITH POSITIVE RESULTS

Molly Johnson

The end of this year marked the completion of the second year of the Walnut PMA project. The objectives of the second year were to continue to focus on reduced risk techniques with an emphasis on standardizing the treatments statewide. By building from the positive responses from the first year, the PMA continues to showcase economic pest control and pushes forward to develop monitoring techniques.

To standardize the treatments for this project that spans from Fresno to Tehama counties, the number of orchards participating in the project was reduced to six and limited to those with trees under 35 feet in height. Although the project has objectives that address several aspects of orchard management, a primary focus of this year's research was to determine the effectiveness of mating disruption to control one of the industry's most challenging pests, codling moth. The treatments in the cooperating orchards were as follows:

Isomate C+  
Isomate C+ and *Trichogramma platneri*  
Isomate C+ and Lorsban or Confirm  
Grower standard  
Untreated control

Each treatment block was approximately five acres with the exception of the untreated control that was approximately one acre. Isomate C+ is a mating disruption product that is applied once by hand shortly after biofix at the rate of 400 ties per acre. Lorsban or Confirm was applied during the 1A or 2A flight or as deemed necessary by the farm advisor. Lorsban was used in orchards with a monitoring history of high codling moth populations and Confirm was used in orchards with low

codling moth populations. *T. platneri* was aerially applied once per week for four weeks during the second generation and once per week for four weeks during the third generation. The eggs are applied at a rate of 200,000 per acre. The grower standard was the growers' normal farming practices, which typically includes the use of organophosphates and pyrethroids.

This year the project was able to demonstrate effective reduced risk strategies for controlling codling moth. To a large extent, codling moth was controlled successfully using only pheromone mating disruption. Damage levels at harvest were less than 2.5% in all the treatment blocks that received Isomate C+ alone. Whereas the treatment of Isomate C+ and Lorsban showed the most control, the Isomate C+ alone and Isomate C+ and *Trichogramma* were encouraging as reduced risk alternatives. A major obstacle to the widespread adoption of hand applied pheromone mating disruption products is the cost. However, as demand for the pheromone product increases and the supply increases, then the product may become more economically feasible for growers.

### Monitoring

The demonstration orchards are monitored extensively throughout the season. Monitoring is an essential component of a reduced risk system. The goals of the PMA project are to promote monitoring as well as refine current monitoring techniques. Each orchard was monitored weekly from biofix to harvest using traps and visual observation.

Five trees were selected at random in each treatment and monitored throughout the season for signs of codling moth damage. The overwintering generation was monitored by nut drop, subsequent generations were monitored by canopy count, and the final evaluation was a harvest sample collected from the windrow prior to pickup. Nut drop and canopy counts are tools to aid in determining the amount of damage after each respective generation. The damage at harvest is the way to determine efficacy of each treatment.

### Blight and Cover Crop Evaluation

In addition to researching and demonstrating reduced risk strategies for controlling codling moth, the PMA is also charged with evaluating reduced risk strategies for other pests that commercial walnut growers face. The walnut blight component was inconclusive this year. Because of the lack of rainfall during the spring of 2000, there was low incidence of walnut blight. One of the goals is to develop a predictive model for blight occurrence, but the evaluation will have to continue for several years to fully measure its reliability and impact.

Cover crops are being evaluated in two of the demonstration orchards in Yuba County. Each orchard contains a planted cover crop treatment and a native vegetation treatment. One cover crop was manually reseeded in the winter of 1999 and the second cover crop was allowed to reseed naturally. Biomass and species counts were assessed from both orchards in both treatments in May 2000.



### Walnut PMA 2001

As the project enters year three the plan is to continue to evaluate the effectiveness of pheromone mating disruption to control codling moth. The project will use the hand tied dispensers as well as evaluate some new technology. A new sprayable pheromone has been developed, but the product has not been widely tested and is not yet commercially available. The PMA project will incorporate this product as a treatment. The components evaluating other pests as well as the cover crop evaluation will continue unchanged.

The Walnut Pest Management Alliance has been active in implementing reduced risk practices and updating farm advisors, field scouts, pest control advisors and growers through its outreach tools. We look forward to the upcoming year and have been awarded funding for a fourth year (2002). Continue to watch for updates in this newsletter as well as fliers advertising field days that will be scheduled during 2001.

### EVERY CHAD COUNTS IN ELECTING YOUR BOARD AND COMMISSION REPRESENTATIVES

This year the Walnut Marketing Board and California Walnut Commission are holding elections for members and alternates for the next two-year term, 2001/2003.

We invite all growers and handlers to consider running for the positions available. We would especially like to encourage eligible women, minorities and those with disabilities to consider serving as a member or alternate. Participation of new individuals will result in new ideas and enhance our overall effort. Now is the time for members of the industry to play an active role in electing the individuals that will represent them on the Board and Commission, said Mr. Dennis A. Balint, Executive Director of the Walnut Marketing Board and CEO of the California Walnut Commission.

Following are the specifications for each election. If you have any questions please feel free to call the WMB/CWC office at (916) 646-3807.

#### WALNUT MARKETING BOARD

Under the regulations of the Federal Marketing Order, 10 members and 10 alternates will be selected by the Secretary of Agriculture. The Secretary will select the Board members and alternates from the nominees elected by the industry.

For the 2001 election here is a list of available member and corresponding alternate positions:

- Two cooperative handlers
- Two independent handlers
- Two cooperative producers
- Two independent producers (one from each district)
- One independent grower at-large
- One public member (nominated by the nine elected members)

The cooperative positions are appointed by the Diamond Board of Directors. Independent growers and handlers will elect their nominees through the following process.

In March the petition forms will be mailed to all independent walnut growers. It takes 10 or more independent growers who marketed an aggregate of 500 tons or more of walnuts in the 1999/00 marketing year through independent handlers to place a grower's name on the ballot.

Ballots will be mailed to independent growers and handlers in April. Independent handlers can vote for incumbents or they can write-in the names of new candidates. The election results will be announced in July.

#### CALIFORNIA WALNUT COMMISSION

Every two years the Commission law provides for the nomination of 13 members and 13 alternates that will be appointed by the California Secretary of Food and Agriculture.

Here is a list of the member and corresponding alternate positions:

- Four independent producers (two from each district)
- Four cooperative producers
- One independent producer/handler
- One cooperative producer/handler
- One independent handler
- One cooperative handler
- One public member (nominated by twelve elected members)

Similar to the Walnut Marketing Board election, the Diamond Board of Directors will appoint the members and alternates for their positions.

All independent growers or handlers participating in the election must complete a nomination form in order for their name to appear on the ballot. These forms will be mailed in May. Independent producer and independent producer/handler candidates must return the form with at least 15 eligible independent grower signatures. For the producer positions the signatures must be from the growers in that district. Independent handler candidates must submit a petition with at least 5 other independent handler signatures.

In July independent growers and handlers are mailed ballots to cast their vote. The election results will be announced in late August.

**District 1:** Counties in the state that lie north of a line drawn on the south boundaries of San Mateo, Alameda, San Joaquin, Calaveras and Alpine counties.

**District 2:** Consists of all other walnut producing counties in the state south of this boundary line.



**California Walnut Commission**  
1540 River Park Drive, Suite 203  
Sacramento, CA 95815-4609

#### BOARD MEMBERS AND ALTERNATES

MEMBERS	ALTERNATES
<b>Independent Producers - District I</b>	
R. Donald Norene .....	Vacant
<b>Independent Producers - District II</b>	
Alfred Bonturi .....	Gerald Deardorff
<b>Independent Grower At-Large:</b>	
Earl Lindauer .....	Phillip N. Short
<b>Independent Handlers</b>	
Jack Mariani .....	Pete Turner
Jim Frazier .....	Steve Giovannoni
<b>Cooperative Producers</b>	
TBA .....	Henry Eilers
William Wagershauser .....	Earl Perez
<b>Cooperative Handlers</b>	
Michael Mendes .....	Dick Wolf
Jack Gilbert .....	Sam Keiper
<b>Public Members</b>	
Dr. Jerome Siebert .....	Dr. Barbara Schneeman

#### WMB/CWC ANNUAL WINTER MEETING FEBRUARY 8-9, 2001 SILVERADO RESORT, NAPA

For more information, contact the WMB/CWC office  
(916) 646-3807 Fax (916) 923-2548

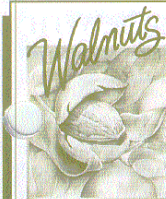
#### COMMISSION MEMBERS AND ALTERNATES

MEMBERS	ALTERNATES
<b>Independent Producers - District I</b>	
Earl Lindauer .....	R. Craig McNamara
R. Donald Norene .....	Julie McNamara
<b>Independent Producers - District II</b>	
Bert A. Crane .....	Janna Baker
Phillip N. Short .....	Walter Deardorff
<b>Producer/Handler</b>	
Charles R. Crain, Jr. ....	Frank V. Guerra
<b>Independent Handlers</b>	
Martin Mariani .....	Jack Mariani
<b>Cooperative Producers</b>	
Robert Driver .....	Robert Graves
James Edwards .....	Jerry Moore
Henry Eilers .....	Earl Perez
David Skinner .....	Charles Gordon
<b>Cooperative Producer/Handler</b>	
Jack Gilbert .....	William Wagershauser
<b>Cooperative Handlers</b>	
Michael Mendes .....	Sam Keiper
<b>Public Members</b>	
Dr. Kirby Moulton .....	Ann Coulston

#### ADMINISTRATIVE REMINDER

A grower who markets less than 2,000 pounds of walnuts annually is exempt from paying the California Walnut Commission assessment. If you are eligible for this exemption, please contact the CWC at (916) 646-3807 for reimbursement.





## CALIFORNIA WALNUT COMMISSION **SUMMER REPORT**

2000/2001

June 2001

### **ISRAEL - The Land of Milk and Honey ... and WALNUTS!**

**T**he California Walnut Commission has been active in the Israeli market for over 10 years. Israel has always been an important market for California walnuts as it has a higher per capita consumption of walnuts than anywhere in the world at a whopping 2.1 pounds per person per year! This is well above U.S. consumption of only about one-third of a pound per capita.

Israel is also important to our industry because their consumption is primarily shelled walnuts, an important part of our

industry, and because we enjoy a 97% market share in Israel. In the 1999 crop/marketing year, shipments to Israel set a new record at 1.5 million shelled pounds and a total of 14,804 million inshell equivalent pounds. This represents a 22% increase in shipments over the previous year.

Our activities in Israel this year include consumer advertising, public relations (PR), in-store promotions and new product tie-ins. Our health message is prevalent throughout all of our communication, but many Israelis already know how healthy walnuts are. Maybe this is why they consume so many. Because of this high health awareness, much of our communication also focuses on versatility - giving the consumer ideas and new uses for an old favorite! In the current marketing year, our agency, Almog Tradex, has developed six new recipes highlighting walnuts as an ingredient. The PR campaign has included product placements on television and radio cooking shows and we are also organizing a California walnut cooking contest at the leading hospitality school in Israel.

Israel is a small country. The total population is only about 6.2 million people. Just under 80% of those are Jewish while the other 20% is mostly Arabic. These two populations have a harmonious coexistence away from most of the conflict in the West Bank.

The Jewish population is the primary market in Israel, consuming most of the tonnage we ship. Walnuts are traditionally consumed as one of many nuts eaten as snacks with or between meals. Because Arabic households have strong traditions, we have not addressed this market in the past. However, as the Arabic family becomes more modern, women are making more of the everyday decisions about the household, working, and enjoying their own incomes.

This change presents an opportunity for California walnuts. Food is a very important part of the Arabic culture. Arabic households spend more of their income on food than the average Israeli does. One important factor is that a hot meal must be served each day. They also have a high familiarity with nuts, but primarily consume pine nuts, almonds and pistachios. Because Arabic women learn to cook at an early age (12 years old), they are eager for new recipes and ideas. All these factors combine to give California walnuts a new opportunity.

For the past two years, the CWC has set aside a small amount of money for Arabic sector marketing and the response has been very good. The first year our efforts focused on a recipe contest. We had

an excellent response from Arabic women. The second year we used billboard and radio advertising focusing on the health message because of the Barcelona Walnut

Study. Both efforts have been successful at raising awareness of walnuts in the Arabic sector. We look forward to many more years of success in Israel as this market continues to grow.

***Israel has a higher per capita consumption  
of walnuts than anywhere in the world.***

### **BARCELONA VIDEO WINS AWARD**

To generate television news coverage for the Barcelona Walnut Study, a *b-roll* video was created and distributed worldwide via satellite. This video recently won a silver Mercury 2000 award.

The Mercury awards, produced by Mercomm Inc. and the International Academy of Communication Arts and Sciences (IACAS), is one of the industry's premiere competitions, honoring excellence in public relations and corporate communications internationally. Now in its fourteenth year, many of the competitions in the Mercomm awards program, including the Mercury, Astrid, Questar, ARC and Galaxy awards, draw over 3,500 entries from around the world.

The Barcelona *b-roll* provided TV news producers with all the elements needed to put together a story. The video consisted of interviews with the scientists involved in the study and with registered dietitian Liz Weiss. It also included laboratory shots, restaurant and supermarket shots, orchards and walnut processing, and kitchen shots showing Ms. Weiss cooking with walnuts.

The Barcelona Walnut Study generated 350 million impressions at launch, 85 million on TV. To date, the study has generated more than half a billion impressions.

## PREDICTOR ADVERTISING TEST UPDATE

Last fall the CWC conducted a domestic advertising test called Predictor, which we briefly discussed in our last newsletter. The purpose of the test was to determine what level of advertising, if any, would have an impact on consumer behavior. Another way to think about this is what would happen if you "turned on" the advertising.

Predictor is a laboratory test methodology where one attempts to duplicate a real world scenario in a test situation. In our case, people were recruited from shopping malls in the metropolitan areas of New York, Chicago and San Francisco to participate in the survey.

Subjects were exposed to our advertising message and then asked to "shop" in a mini test market. This market was designed to look like the shelves of a real grocery store and the prices reflected actual pricing for the area. Three groups or "cells" were used in the test.

The first "cell" saw no advertising, then went shopping and then was surveyed. The second "cell" saw our test advertisement, then went through the next steps of shopping and surveying. Finally the last "cell" saw all available walnut advertising messages (not including promotions) and then proceeded with the shopping and survey.

These three cells enabled us to compare a control group to the other two groups. The test concluded that during the pre-Thanksgiving/Christmas period, a health message designed to build general awareness of California walnuts does not resonate well. The test results show no increase in purchase behavior between the control cell (with no advertising) and the second two cells when advertising was "turned on."

What does this mean to our industry? Basically, for now, it means that our existing public relations (PR) campaign has been and continues to be effective. Our message on the health benefits of walnuts is best communicated through a third party such as a magazine, newspaper, doctor, nutritionist or other credible source. These groups are the targets of our current PR program. Given the advertising test results, our plans for the coming year are to strengthen our public relations program to best communicate the message of health with emphasis on the great taste and versatility of walnuts.

## EU INSHELL WALNUT STANDARD CROP YEAR 2001

The European Union (EU) has adopted the UNECE Standard for Inshell Walnuts with few modifications. The EU standard will take effect September 1, 2001. It is a regional standard that will affect Inshell product shipped into the European Community. Parallel checks (USDA & EU) need to be made as lots are produced to make certain that product shipped into the EU is in compliance with the EU standard for Inshell walnuts. If you have questions regarding the EU Standard and would like a copy, call Duane Lindsay at (209) 606-8675.

## WALNUT SALES KEEP PACE WITH LOWER CROP

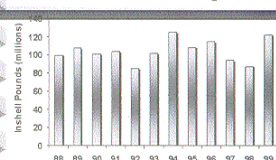
The 2000/2001 California walnut crop totaled 239,000 short tons. The industry gained momentum during the 1999/2000 crop year largely due to the record crop of 283,000 tons and an equally impressive total availability of over 353,000 tons. By now we know that low prices accompanied this huge crop, however, the utilization of this crop at record levels paved the way for what is shaping up to be a much better campaign this year.

Historically we have depended on the inshell walnuts to get off to a blazing start. Table 1 shows the pattern of inshell walnut exports dating back to 1988. The pattern is irregular due to the fact that quality and availability have a great impact on our ability to export inshell walnuts. The availability of inshell varieties in the current crop year was less than desirable and for that reason we are projecting total utilization of barely 115 million pounds. Of that, about 91 million pounds will go to the export market.

Our top five markets for inshell walnuts are depicted in Table 2. Spain is and away is our number one market for inshell exports. The current crop year shows Spain ahead of last year's record pace and it is conceivable that they will, by year's end, achieve shipments of 34 million pounds. The USA is number two followed by Germany and Italy. Italy's performance has been up and down over the past 10 to 12 years while Germany has been in decline. The decline in Germany is more attributable to resistance from the trade not the consumer.

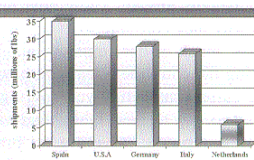
Shelled walnut exports are another story. Table 3 indicates that shelled walnut exports have trended upward steadily. This year despite the crop which is nearly 16% lower than a year ago, shelled walnut exports are even with last year's shipments through March. Domestic shipments are only off slightly, making our overall shelled performance quite impressive.

**Inshell Walnut Exports**



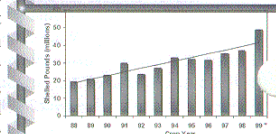
**Table 1**

**Inshell Markets  
1999/2000**



**Table 2**

**Shelled Walnut Exports**



**Table 3**



#### Shelled Overseas Markets 1999/2000

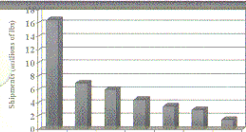


Table 4

However, for the long term we believe that Japan is healthy.

Finally, if you review Table 5 you will see the pattern of U.S. walnut farm prices as reported by USDA since 1985. Obviously, the last two crop years have not been impressive although the string of prices achieved between 1992 and 1997 were quite strong. We can only assume that the strength of the market this crop year will result in a return to better farm gate prices for walnuts.

#### U.S. Walnut Farm Prices

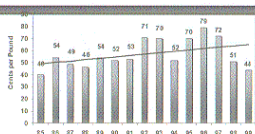


Table 5

The coming crop year is still a question mark in everyone's mind. Many areas experienced frost in the early spring. This calls into question how the affected acreage will respond. However, based upon historical norms we would expect the coming to be a large one. Inshell varieties should be more plentiful and handler acreage continues to come into production making it difficult for us know exactly what to expect in terms of overall production. The industry should be well prepared, however current shipment levels would indicate that the carryout will be lower than average.

At least one and possibly two new health studies will be publishing within the next six months. This is certain to give our sales a boost. The growing pains we have experienced will pay dividends in the future.

#### FALL JAPANESE & KOREAN TRADE RECEPTIONS

November 8, 2001 Akasaka Prince Hotel Tokyo, Japan	November 13, 2001 Grand Hyatt Hotel Seoul, Korea
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#### NEWSLETTER ONLINE

Beginning with this issue, the CWC newsletter will be available on the web site. In addition, beginning next month we will announce upcoming meetings of the Board and Commission on the web site. Log on to [www.walnuts.org](http://www.walnuts.org) and see what's new! If you have any comments or questions, write us at the WMB/CWC E-mail address [wmbcwc@walnuts.org](mailto:wmbcwc@walnuts.org).

#### WMB/CWC WELCOMES NEW STAFF MEMBERS



Ms. Janelle Zobelein joined the staff of the Walnut Marketing Board and the California Walnut Commission on March 19, 2001, as the new Assistant Marketing Director overseeing the domestic and Canadian marketing program. Ms. Zobelein brings with her over five years of public relations, public affairs and marketing experience. She previously held a Counselor position with Porter Novelli, a worldwide public relations agency.

Ms. Zobelein holds a B.A. in Organizational Communications from Sacramento State University. She succeeds Ms. Jodi Newman who has now relocated to Washington state.

Ms. Dana Steindorf also joined our staff on March 28, 2001, as Secretary to assist the marketing staff and budget director. Ms. Steindorf has over 10 years experience as an executive/administrative assistant. She previously held the position of assistant to the Senior Vice President of Healthaxis, an insurance technology company. Ms. Steindorf grew up in Colusa County and her father worked in the walnut industry for many years, so she is delighted to be working for the Walnut Marketing Board.



#### In Memory of...

The walnut industry has lost two of its members. They will be missed.

**Stephen F. Danna, Sr.** passed away on December 10, 2000

**John A. Azevedo, Jr.** passed away April 30, 2001

#### WMB ELECTIONS DRAW TO A CLOSE CWC ELECTIONS GET UNDERWAY

The Walnut Marketing Board is now in it's final weeks of the election period for selecting members and alternate members for District 1 and 2 as well as the at-large position. Ballots are available from your Farm Advisor's office or the Walnut Marketing Board office. **Ballots must be postmarked and mailed no later than May 25, 2001.** The results will be announced in July.

The California Walnut Commission elections for the next two year term are now just getting underway. Petition forms have been mailed to growers to nominate four independent producer member and alternate positions, one independent producer-handler member and alternate, and one independent handler member and alternate. **Petition forms must be returned on or before June 8, 2001** in order for the candidate's name to appear on the ballot. Ballots will be mailed in July and must be postmarked no later than **August 17, 2001.** The results will be announced August 30, 2001.

We encourage all eligible growers to participate in the election process, including women, minorities and those with disabilities. You are urged to vote and return your signed ballot on or before the due date. If you have any questions regarding the elections, please call (916) 646-3807.



## WALNUT PRODUCTION RESEARCH

The Walnut Marketing Board (WMB) Research Committee met on March 21, 2001 to develop funding recommendations for 2001/2002 research proposals. They were originally presented at the 33rd annual Walnut Research Conference in Bodega Bay in January, and subsequently reviewed by a technical committee of researchers and farm advisors who provided their analyses to the WMB Research Committee.

Twenty-one research proposals representing a total budget of \$593,233 were recommended to be presented for approval to the full board in September. Additional projects will be considered in July and may alter the committee's recommendation. Four of the 21 projects are new and should help address several current key priority problems: codling moth, root lesion nematode/loss of methyl bromide (MB), harvest molds, and pollination requirements/PFA/blackline. The new research projects are:

- Management of Codling Moth with Bisexual Attract & Kill Tactics—Doug Light, USDA-ARS, Western Regional Research Center (WRRC), Albany.
- Field Evaluations of MB Alternatives/Input for Grower Replant Settings and New Lines of Nematode Resistance—Mike McKenry, UC Kearney Ag Center.
- Irrigation Management and the Incidence of Mold in Walnuts—Terry Prichard, UC Davis.
- Walnut Pollination Dynamics: Pollen Flow and Pollen Loads in Walnut Orchards—Vito Polito and Steve Weinbaum, UC Davis.

The distribution of the 2001/2002 research budget is as follows:

Program Area	No. Projects	Budget Amount
Cultivars/rootstocks	4	\$129,231
Walnut blight	3	127,456
Codling moth	3	82,218
Crown gall	2	68,536
Horticulture/blackline	2	66,074
Nematodes/MB alternatives	2	43,625
Harvest/postharvest	3	42,906
Phytophthora	2	33,187
	21	\$593,233

## WALNUT BREEDING PROGRAM FIELD DAY ANNOUNCED

*Bruce Lampinen and Gale McGranahan, (UC Davis)*

About 30 growers, processors and Farm Advisors attended the UC Walnut Breeding Program crack out on March 15. "Crack out", a full day meeting, is a means for the walnut industry to provide input into the Walnut Breeding Program. It is also a lot of work. Data sheets containing all the information from the previous growing season (leafing, flowering, and harvest dates, blight incidence, and

yield) and crack out evaluations (shell and kernel characteristics including size color and percent kernel) were provided to two person teams. Each team evaluated and discussed the 520 selections that were displayed (out of the 2298 seedlings under evaluation this year). In a group discussion 27 new selections were identified. It was felt that three of these should be put on a fast track for earlier release than was planned.

There will be a Walnut Breeding Program Field Day on the Davis Campus during early August to show growers interested in putting out test plots some of the more promising advanced selections from the walnut breeding program. If you are a grower and are interested in attending this field day and would consider putting in a small test plot with some of this material under a test agreement, contact your farm advisor or Bruce Lampinen (530) 752-2588, [bdlampinen@ucdavis.edu](mailto:bdlampinen@ucdavis.edu) by July 18th to find out details about the meeting. As part of the test agreement, periodic reporting of your observations on this material will be required.

## WALNUT PMA PROGRAM

### REDUCED RISK ORCHARD MANAGEMENT PACKAGE EMERGING FROM PMA TRIALS

*by Will Stockwin*

The essential value of the Walnut Pest Management Alliance (PMA) Project is the transition it provides between research and field application of reduced risk techniques for controlling pests such as codling moth and walnut blight. With the project now entering its third season, the pace of moving those techniques from the lab to the field is beginning to quicken as an integrated package of proven reduced risk techniques that growers can use with confidence begins to emerge.

The industry wouldn't be nearly as far along toward solving some of its most vexing problems without the PMA test bed, which has generated new ideas and approaches for improving familiar techniques and quickly validated experimental ones.

Carla Thomas' lead article on Xanthocast highlights a new model for blight forecasting that complements the work Steve Lindow has been doing in conjunction with PMA. He's monitoring bud population counts to determine spray thresholds and evaluating the efficacy of bud break sprays. Knowing when to spray is also critical and Thomas says researchers have figured out how to reliably take the guesswork out of forecasting blight conditions. In PMA test plot validation studies, she says that's added up to fewer sprays and not getting caught flat-footed by heavy dew. At least so far. She expects this year's data to further confirm that trend.

The February 2001 CWC Winter Report carried an article by Steve Welter on the reduced risk strategies for controlling codling moth in walnuts being developed by PMA. In this issue you'll read a report



from University of California farm advisor Joe Grant on the progress his San Joaquin Walnut BIOS project has made taking some of the strategies Welter wrote about into the field. Supported by field days and workshops conducted by Community Alliance with Family Farmers, Grant is seeing good yields and quality using pheromone disruption in conjunction with other BIOS methods. Reduced sprays and fertilizer applications too.

Bob Van Steenwyk's article on insect growth regulators is another case in point. He has been working with IGRs for years, but PMA has given him the opportunity to expand the integration of his findings into field applications. He scans the softer spray materials - Confirm, Esteem, Success and Dimilin - and concludes they provide effective control and fit into IPM systems because they do not disrupt beneficial insect populations. He's also seeing increased efficacy when they are used in combination with each other.

## XANTHOCAST A NEW DISEASE-FORECASTING MODEL FOR WALNUT BLIGHT

*Carla Thomas, FieldWise, Inc.; James E. Adaskaveg, UC Riverside; Bill Olson, UCCE Butte County; Richard Buchner, UCCE Tehama County; and Janine Hasey, UCCE, Sutter/Yuba County*

A new disease risk model for estimating risk of walnut blight infections was introduced and is being evaluated in the Sacramento Valley this year. The model is called XanthoCast and was developed by Dr. James Adaskaveg, University of California, Riverside, CA. The model is the result of an intensive 7-year research program that was funded by the Walnut Marketing Board and included collaboration with Bill Olson, UCCE Butte County, and Richard Buchner, UCCE Tehama County.

XanthoCast presumes that have the bacterial pathogen and that the organism reproduces in wet environments. The model is based on measuring the temperature during leaf wetness events to determine if conditions are favorable for walnut blight development in the orchard. Each day an index is calculated. Then the index for that day is added to the accumulated index for the previous 6 days to determine a 7-day risk index. Sprays should be applied if the crop is in a vulnerable stage (female flowers or nuts present), if the crop has not been sprayed for at least 7 days, and if the index is 6 or higher or if rain is forecasted to occur. (A threshold of 4 can be used if the grower desires maximum protection).

The model has performed well in validation studies and is now being experimentally implemented on a regional scale in 2001. It often saves one to several sprays as compared to a calendar-based program without a reduction in disease control. The model calls for application of bactericides to protect the nuts when they need protection the most. It also allows us to not spray if the spray is not needed, reducing the risk that bacteria will develop resistance to our spray chemicals. This is the basis of sound Integrated Pest Management Strategies.

most mature orchards

***"Environmental conditions are critical to understanding walnut blight control."***  
***- Jim Adaskaveg, UC Riverside***



Jim Adaskaveg's research team is working with FieldWise to implement this model in the Sacramento Valley. FieldWise is a private company that operates an agricultural weather network of 50 stations located between Dixon and Red Bluff. Each day the XanthoCast Walnut Blight Index is calculated for each weather station to produce a color map of the Sacramento Valley that shows areas of low disease risk as green, moderate disease risk as yellow, and high disease risk as red. Growers can see this map on the Internet by registering for free at [www.fieldwise.com](http://www.fieldwise.com). Griffin, LLC, sponsors the map as a service to walnut growers and processors. It is updated daily, 7 days a week. Growers can also find a list of weather conditions and disease risk values for all the weather stations in text form.

If the grower's orchard is in a red area and it has not been sprayed for 7 or more days, then it is appropriate to spray. If the orchard is in a yellow area and the grower wants to be extra careful or if rain is forecasted and the orchard has not been sprayed for 7 days it is appropriate to spray. If the orchard has been sprayed within the last 7 days or if it is in a green area and no rain is forecasted, it is not necessary to spray. Because rain forecasts are important, the Walnut Marketing Board is sponsoring a Satellite Rain Analysis, produced by Fox Weather, to help walnut growers know if rain is likely to occur. A 5-day disease forecast based on weather forecasts is currently being developed for 2002.

But just knowing if rain is expected is not enough; in some years disease can be more severe with additional wetness from dews. Thus, the weather stations are very important. They not only give the forecaster better data to use to make the forecast, but they also tell us if dew was sufficient to allow a disease event in the absence of rain. This year we are experiencing numerous brief, cold showers in the Sacramento Valley. The XanthoCast Index lets us know if the shower was enough to get disease going or not.

The University of California Walnut Pest Management Alliance (PMA) and UCCE farm advisors in the Sacramento Valley are conducting additional validation studies on the XanthoCast model this year in Butte and Yuba Counties. It also is being demonstrated at a Walnut PMA site this year in Stockton and was tested in Stockton and Vernalis last year. Carolyn Pickel, UCIPM Regional Advisor, is coordinating these efforts in 2001. It is expected that the XanthoCast PMA demonstration trials will be expanded throughout the Central Valley in 2002 in collaboration with FieldWise and Western Farm Service.



***"We think this approach will help growers to time their sprays to be more effective."***  
***- Carla Thomas, FieldWise, Inc.***

Growers are reminded that Xanthocast is a model being developed as a guideline for disease management. The model is not for use as a recommendation for pesticide application by the University of California, the Walnut Marketing Board, or the California Walnut Commission. Growers should consult with a qualified pest control advisor (PCA) for developing pest management programs.

For more information on how to access the information, go to [www.fieldwise.com](http://www.fieldwise.com) or contact your local farm advisor, PCA, or Carla Thomas at 559-281-0328.



## WALNUT BIOS PROJECT ENTERS THIRD AND FINAL YEAR

Joe Grant, Farm Advisor, San Joaquin



**T**he San Joaquin Walnut Biologically Integrated Orchard Systems (BIOS) project was started in 1999 to test the feasibility of reducing pesticide and fertilizer while still producing high quality walnuts with low damage levels under walnut farming conditions in the northern San Joaquin Valley.

The project is a three-year effort funded by the UC Sustainable Agriculture Research and Education Program. 2001 is the project's final season.

Twelve 10-20 acre BIOS demonstration sites have been established in San Joaquin County walnut orchards. Eight of these sites are paired with conventionally managed blocks to compare success and feasibility of BIOS methods with conventional walnut farming practices. The project is coordinated by Joe Grant, UC Cooperative Extension Farm Advisor in San Joaquin County. The Community Alliance with Family Farmers (CAFF), a California based farm advocacy group, organizes educational field days, workshops, and other educational events for the project.

BIOS farming practices being used in project orchards include: substituting "soft" insecticides, pheromone mating disruption and

beneficial insect releases for broad spectrum disruptive insecticides; selective use of cover crops to help improve water penetration, reduce run-off, build soil tilth & fertility, and enhance beneficial insect activity; intensive monitoring of pests and beneficials to provide an "early warning system" for pest outbreaks and aid in understanding pest & beneficial interactions; leaf tissue analysis and nitrogen budgeting for more precise fertilizer applications; and replacing pre-emergence herbicides with post emergence materials where feasible.

Results from the first two years of the project have provided valuable information on deployment of BIOS techniques in walnuts. As the key pest in walnuts, codling moth has been a major focus of the project. In the 2000 season, 11 of the 12 project growers used mating disruption in their BIOS blocks for controlling codling moth. Mating disruption has not previously been considered economically feasible in walnuts because of the high cost of pheromone and the large tree size and air volume that would have to be permeated with pheromone for effective mating suppression. Key project successes in BIOS blocks include good yields and quality while reducing pesticide use, increasing generalist predator activity, reductions in nitrogen fertilizer use without compromising production, and effectively deployment of cover crops to solve orchard problems.

BIOS blocks are also being used by several WMB funded research projects aimed at refining our understanding of codling moth mating disruption, walnut blight epidemiology, pest-beneficial interactions, and other elements of biologically integrated orchard management. For further information on project field days or to receive copies of its newsletter, contact Joe Grant (209) 468-9490, or Jeannine Groh (209) 468-2085.

### Walnut Pest Management Alliance

#### Cover Crop Field Day

Thursday, May 31, 2001

10:00 a.m. - Noon

Deseret Farms, Yuba County

1 hour of PCA  
credit applied for

#### Topics and Speakers:

Update on Pest Management Alliance Projects

*Bob Elliott, Department of Pesticide Regulation*

Walnut PMA Cover Crop Trial Results

*Janine Hasey, Sutter/Yuba Counties Farm Advisor*

Grower Experience with a Planted Cover Crop

*Mike Bennett, Walnut Grower*

Improving Efficiency to Save Money and Power

*Terry Prichard, UCCE Irrigation Specialist*

Impact of a Cover Crop on Reducing Spray Runoff

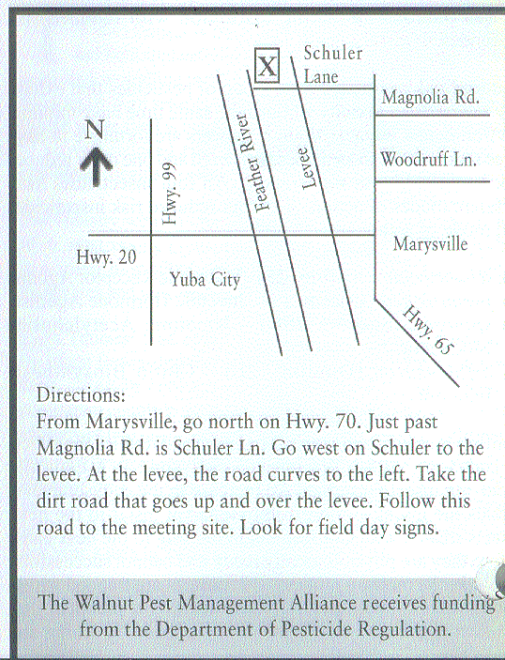
*Bill Krueger, Glenn County Farm Advisor*

Xanthocast - A Predictive Model for Walnut Blight

*Carla Thomas, Plant Pathologist*

Update on the Walnut PMA Web Site

*Will Stockwin, CAFF Media Coordinator*





## REDUCED RISK INSECTICIDES AND THEIR USE IN WALNUT PEST MANAGEMENT

Robert A. Van Steenwyk  
Dept. of E.S.P.M., U.C. Berkeley



**C**odling moth (CM) is the key insect pest of walnuts in California. Control of CM in walnuts has relied on repeated applications of Guthion or other insecticides. The repeated use of Guthion and other insecticides has resulted in the outbreak of a number of secondary pests,

such as walnut aphids and spider mites, which requires additional insecticides/miticides for their control. Also, the repeated use of Guthion has resulted in the development of CM resistance to Guthion and cross-resistance to most alternatives.

In addition, the U.S. Congress unanimously passed and the President signed the Food Quality Protection Act (FQPA) in the summer of 1996. This piece of legislation will have a significant impact on all pesticides used in the U.S. and particularly organophosphate (OP) insecticides, e.g. Lorsban, Guthion, PennCap-M, Imidan, etc. Currently, the EPA is reviewing OP insecticides and it is anticipated that use of many OP insecticides may be greatly restricted by the EPA action. Thus alternative controls for CM must be found and tested in the near future to maintain an economically viable walnut industry. One alternative control method is the combination of CM pheromone mating disruption with reduced risk pesticides.

Reduced risk pesticides are a group of pesticides that exhibit low mammalian toxicity while at the same time have minimal environmental impact. Walnut growers are fortunate to have three reduced risk insecticides registered and one other reduced risk insecticide near registration. All four insecticides have different modes of action. The four reduced risk insecticides and mode of action are:

- (1) *tebufenozide* (Confirm 2F) - Ecdysone Receptor Agonist
- (2) *pyriproxifen* (Esteem ) - Juvenile Hormone Agonist
- (3) *spinosad* (Success 2SC) - Nicotinic Acetylcholine Modulator
- (4) *difluenzuron* (Dimilin 2L) - Chitin Biosynthesis Inhibitor

Confirm is an ecdysone receptor agonist and mimics the effects of ecdysone within the insect. Ecdysone is a naturally occurring insect hormone. An increase in the ecdysone level signals the insect to molt from one larval instar to the next. Insects treated with Confirm begin molting to the next instar before they are physiologically ready and cannot successfully complete the molting process. The insects are trapped within the old exoskeleton and starve to death. In practical use, Confirm is a larvicide. Confirm is produced by Rohm and Haas Corp.

Esteem is a juvenile hormone agonist that mimics the effects of the juvenile hormone within the insect. A decrease in the juvenile hormone level signals the insect to change from one stage (e.g. egg) to the next stage (e.g. larva or nymph). Insects treated with Esteem remain in their present juvenile stage. They do not develop on to the next stage. In practical use, Esteem is an ovicide.

The amount of Esteem needed to prevent the pupation is much higher than the amount needed to prevent egg hatch. Esteem is a recently registered insecticide for use on walnuts and is produced by Valent Corp.

Success is a nicotinic acetylcholine modulator that appears to increase the sensitivity of the nicotinic acetylcholine receptor site to acetylcholine, the chemical messenger that carries a nerve impulse across the synapse. Mammalian nicotinic acetylcholine receptor sites appear to be different from insect nicotinic acetylcholine receptor sites. Success does not bind or modify the mammalian receptor sites to the same degree as the insect's receptor sites. This binding affinity may account for the differential toxicity between mammals and insects. Success is produced by Dow AgroSciences Corp. Registration of Success on walnuts is expected next season.

Dimilin is a chitin biosynthesis inhibitor that prevents the proper development of chitin. Chitin is the structural component of an insect's body. Dimilin prevents the developing insect embryo from synthesizing the necessary chitin to support the young larva. In practical use, Dimilin is an ovicide. For Dimilin to be effective, a CM egg must be oviposited on the Dimilin residue. The newly deposited eggs absorb the Dimilin through the bottom of the eggshell. Dimilin is not as effective if applied to eggs that are already laid. Dimilin is produced by Uniroyal Corp.

These reduced risk insecticides have little or no measurable mammalian toxicity. They have 40 times or less oral toxicity than Guthion and 10 times or less dermal toxicity than Guthion. A 200 pound man would have to consume in excess of 1 pound of active ingredient of these compounds to have a deleterious effect. In addition to having little or no mammalian toxicity, these insecticides have minimal environmental toxicity. They are about 10 times less toxic to quail than Guthion and from 300 to 5,000 times less toxic to trout than Guthion. However, there are areas of environmental concern with some of the reduced risk insecticides. Esteem has been reported to prevent the pupation of ladybird beetles, such as the vedalia beetle in southern San Joaquin Valley citrus groves. Another area of concern is the toxicity of Success to honeybees. Success is very toxic to honeybees and should not be applied when bees are actively foraging in the orchards. If Success needs to be applied when bees are present, a possible solution is to apply Success at night when the bees are not active. Success is far less toxic to honeybees when dried on the foliage. Dimilin is highly toxic to aquatic arthropods such as Daphnia and care should be taken not to contaminate streams directly.

Confirm is also capable of controlling low to moderate codling moth populations. Confirm should be applied as CM egg hatch

begins when young larvae are present. For the first generation, Confirm should be applied at 200 day-degrees (DD) from the first CM for the 1A flight. In addition, Confirm should be applied at 550 to 600 DD from the first CM biofix for the 1B CM flight. For the second flight, Confirm should be applied at 200 DD from the second CM biofix. Since good coverage is very important, Confirm should be applied with 250 gals per acre with a tractor ground speed of 1.5 mph to provide adequate coverage. In addition, Confirm should be applied with an appropriate adjuvant (spread/sticker) or narrow range horticultural oil to increase uniformity of coverage. Confirm should be applied at 1 pt to 2 pt per acre with a maximum 1 gal per acre for the season. In orchards with very tall trees (35 ft or larger trees) use a split application with about 3/4 pt applied by aircraft and 1 and 1/4 pt applied by air blast speed sprayer. Do not exceed 2 pt per acre per combined ground and air applications. Confirm has a 30-day preharvest interval (PHI).

Esteem is effective against walnut scale and San Jose scale but will play only a minor or secondary role in CM control. For scale control Esteem should be applied at the delayed dormant period and/or when scale crawlers first appear in May at a rate 1 pt per acre. If a treatment is applied during the delayed dormant period, include about 1/4% narrow range horticultural oil by volume or adjuvant (spread/sticker) if trees are under any moisture stress. If a treatment is applied during May, include about 1% narrow range horticultural oil by volume or adjuvant (spread/sticker) if trees are under any moisture stress. The May application will provide partial CM control. For CM control apply 1 pt of Esteem per acre at 100 DD after CM biofix with a maximum 2 pt per acre for the season. However, since nut and foliage is rapidly growing early in the season, adequate coverage at 100 DD may not be possible for first flight CM control. It is advisable to delay application until foliage is fully expanded and apply Esteem prior to egg hatch for the 1B flight and/or 2A flight. Esteem should be applied with 250 gals per acre for in-season use and at 400 gals per acre for delayed dormant use with a tractor ground speed of 1.5 mph to provide adequate coverage. Esteem has a 21 PHI.

Success is also capable of controlling low to moderate CM populations. Since Success acts in a somewhat similar manner to conventional insecticides, the timing of Success should be at conventional insecticide timing. Success should be applied at 250 to 300 DD from the first CM biofix for control of the 1A flight of the first generation. In addition, Success should be applied at 650 to 700 DD from the first CM biofix for control of the 1B CM flight. For the second flight, Success should be applied about 250 DD from the second CM biofix. When Success is registered it is expected have a 7 day PHI with a use rate of 6 to 10 oz. per acre and a maximum of 29 oz per acre for the season. Since good coverage is very important, Success should be applied with 250 gals per acre with a tractor ground speed of 1.5 mph to provide adequate coverage. In addition, Success should be applied with a narrow range horticultural oil to increase uniformity of coverage and aid in movement of Success into the leaves.

Dimilin has not been capable of controlling CM alone and needs to be used in conjunction with other reduced risk insecticides. Since Dimilin is acting as an ovicide and the CM eggs need to be deposited on the Dimilin residue, the timing of Dimilin for CM control should precede oviposition. However, since nut and foliage is growing rapidly early in the season, adequate coverage is difficult before the first flight CM. Therefore, it is advisable to delay application until foliage is fully expanded. Dimilin should be combined with Confirm or Success, when registered, and applied at 650 to 700 DD from the first CM biofix for control of the 1B CM flight. For the second flight, Dimilin should be combined with Confirm or Success and applied about 200 DD from the second CM biofix. Apply Dimilin at 1 to 2 pt per acre with a maximum 3/4 gal per acre for the season. Dimilin has a 28-day PHI. It appears that Dimilin residues have considerable longevity in excess of 30 days. Again, since CM eggs need to be deposited on the Dimilin residue, good coverage is very important. A minimum of 100 gal of water per acre but preferably 250 gals per acre with a tractor ground speed of 1.5 mph is required to provide adequate coverage. Since good coverage is very important, Dimilin should be applied with 250 gals per acre with a tractor ground speed of 1.5 mph to provide adequate coverage.

Since the reduced risk insecticides have different modes of action and are active against different stages of insects, the combination of two reduced risk insecticides could greatly improve their efficacy and provide a synergy of control. The combination of either Confirm or Success, which are effective larvicides, with Dimilin or Esteem, which are effective ovicides, should provide control equivalent to or better than the grower standard of multiple OP insecticide applications. In addition, a single combination application of reduced risk insecticides may stabilize pest control in orchards under CM pheromone mating disruption.

In addition, the agrochemical industry has currently under development a number of new reduced risk insecticides, many of which are targeted for registration on walnuts. One promising new class of insecticides is the neonicotinoids (Provado, Actara, Assail, Calypso and others). Other reduced risk insecticides that will be registered on walnuts in the very near future are Avaunt and Intrepid. These new reduced risk insecticides have activity against aphid, walnut husk fly, navel orangeworm and CM. The registration of these new reduced risk insecticides is expected within the next few years. With more reduced risk products registered on more crops, the cost of these products is expected to decline over time.

The advantages of reduced risk pesticides are that they have very low mammalian toxicity and at the same time show environmental safety. They have limited impact on wildlife and are, in general, pest taxa specific. They are less disruptive to the beneficial insect and mite complex which results in less outbreaks of walnut aphids and web spinning mites. They can be integrated with other control methods such as pheromone disruption and biological control to provide sustainable pest control for years to come.





# LOGO MERCHANDISE 2001

Distributed by:



Also Available (not pictured) - Ties, Childrens Book (See Below)

Logo A



## Order Form



Logo B

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All items (except Coffee Cup), are embroidered with choice of A) California Walnut Logo or B) CW Walnut Mascot logo. This completed form can be mailed to: California Walnut Commission, 1540 River Park Dr., Suite 203, Sacramento, CA 95815. You may also fax it to: (916) 923-2548. Payment must accompany order. Delivery is usually 1-2 weeks and order will be shipped to address indicated above.

Item	Amount	Name on Back	Your Name on Back	Logo available if you wish	Total
11 oz. Coffee Cup	Full Color "CW" logo on front of mug. Amount _____	Name on Back _____	Your Name on Back _____	Total _____ x \$ 6.00 =	
* Note - If you want your logo on the mug, please call Jim at Instant Impact (916) 652-4252 to discuss details					
Baseball Cap	Available in Khaki with Black, Navy or Forest bill	Amount _____	Color _____	Total _____ x \$ 8.00 =	
Polo Shirt	Available in Mens or Womens in the following colors: White or Black	Mens or Womens _____	Amount _____	Color _____	Total _____ x \$ 13.00 =
Denim Shirt	Available in Short or Long Sleeve in the following: Light Denim, Denim or Natural	Short or Long _____	Amount _____	Color _____	Total _____ x \$ 21.00 =
Apron	Available in Forest Green only	Amount _____		Total _____ x \$ 9.00 =	
Hand Towel	Available in Hunter Green or Navy	Amount _____	Color _____	Total _____ x \$ 10.00 =	
Crew Sweatshirt	Available in Ivy only	Amount _____		Total _____ x \$ 36.00 =	
T-Shirt	Available in Navy or White	Amount _____	Color _____	Total _____ x \$ 10.00 =	
Children's Book	"A Timeless Journey" as told by Mr. Walnut	Amount _____		Total _____ x \$ 15.00 =	
Tie	Available in Green/Blue, Burgundy/Blue or Blue/Gray	Amount _____	Color _____	Total _____ x \$ 6.00 =	
Subtotal					
Tax (7.00%)					
Total					

Credit Card Customers fill out below:

Card Number \_\_\_\_\_ Shipping (\$3.50 for one item, \$6.50 for 2-5 items, \$9.75 for 6-9 items)

Expiration \_\_\_\_\_ Signature \_\_\_\_\_



**California Walnut Commission**  
1540 River Park Drive, Suite 203  
Sacramento, CA 95815-4609

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#### WMB/CWC ANNUAL FALL MEETING SEPTEMBER 6-7, 2001 DOUBLETREE HOTEL, SACRAMENTO

For more information, contact the WMB/CWC office  
(916) 646-3807 Fax (916) 923-2548

#### ADMINISTRATIVE REMINDER

A grower who markets less than 2,000 pounds of walnuts annually is exempt from paying the California Walnut Commission assessment. If you are eligible for exemption, please contact the CWC at (916) 646-3807 for reimbursement.